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USER'S GUIDE FOR AN OPTICAL CONTRAST SEEKER MONTE CARLO
TERMINAL HOMING SIMULATION

S. L. O'Hanian, et al

Army Missile Research, Development and Engineering
Laboratory
Redstone Arsenal, Alabama

14 May 1975

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**USER'S GUIDE FOR AN OPTICAL CONTRAST SEEKER
MONTE CARLO TERMINAL HOMING SIMULATION**

S. L. O'Hanian, A. W. Lee, Jr., and C. L. Lewis
Guidance and Control Directorate
US Army Missile Research, Development and Engineering Laboratory
US Army Missile Command
Redstone Arsenal, Alabama 35809

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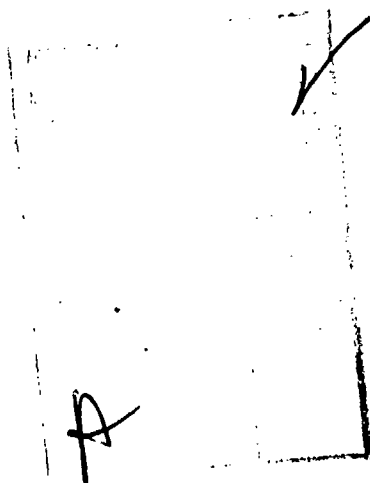
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report documents the development and incorporation of a stochastic Optical Contrast Seeker Model into the existent Monte Carlo point target terminal homing 6-DOF simulation program. In addition the basic pitch and yaw seeker platform dynamics, parameter target size, seeker breaklock, seeker blind range, transport lag, and helicopter induced launch transients are included. Platform imperfections such as mass unbalance and rate gyro drifts were modeled. Each data point generated by the simulation is obtained from the statistical reduction of approximately 25 individual runs (depending on number of breaklocks),		

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20. ABSTRACT (continued)

each of which has new random starting and within run variations. The runs are reduced by parametric or nonparametric means, depending on the normality of the miss distance points, to yield the miss bias (mean) and the circular error probability (GEP).

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1.0 INTRODUCTION

A stochastic simulation model of an Optical Contrast Seeker (OCS) was developed and incorporated into the existent Monte Carlo point target, laser guided, terminal homing 6-DOF simulation program described in reference 2. Two OCS simulation subroutines were developed: (1) a subroutine consisting of high and low frequency poles, and (2) a simplification of the first consisting of only low frequency poles. The non-essential high frequency poles of the OCS model were eliminated to reduce computer run time. This simplified subroutine is, in general, sufficient; however, either subroutine may be used by setting the appropriate flag.

The 6-DOF simulation program was modified to include a two-dimensional target and helicopter vibrations. The target dimensions are required for study of the OCS breaklock and blind-range phenomena. The helicopter vibrations were added to describe the missile launch transients.

The updated 6-DOF simulation program may continue to be run as either a stochastic or deterministic program. In the stochastic mode, the program executes a specified number of runs*, computes miss distance coordinates from each run, and then determines the CEP and other statistical parameters from the set of miss distances. Each run of the run set is made based on both initialization error conditions (mass unbalance, etc.) and time varying error conditions (wind, etc.) that are randomly generated from input error probability distributions. In the absence of statistical input data, the operation of the 6-DOF program reverts to that of the deterministic version of the program.

Because of the addition of the two OCS subroutines and associated 6-DOF program modifications, the computer program listing contained in this document supersedes the listings found in references 1 and 2. However, the deterministic program model description and input/output formats found in reference 1 and the stochastic program description and input/output formats found in reference 2 are still valid.

*A run is defined as the numerical integration of a missile trajectory from launch to target plane intercept.

2.0 FUNCTIONAL DESCRIPTION

Figures 2.1 and 2.2 are the block diagram representations of the OCS simulation model, Model S2. Figure 2.1 represents the pitch channel and Figure 2.2 represents the yaw channel. The transfer functions given in these block diagrams were transformed by use of the M-method into state variable format for solution by numerical integration. A new seeker subroutine (S2) was developed to control the integration of these state variables and to perform other calculations pertinent to the OCS.

Because of the modular concept of the 6-DOF simulation program, interfacing the new subroutine required minimal effort, particularly since the input and output variables of this seeker subroutine were identical to those of the laser seeker subroutine, S1. The one exception to this was the missile-body-to-seeker-gimbal coordinate transformation matrix, since the OCS seeker mounting has been rotated 90 degrees from that of the laser seeker. This necessitated a new matrix for transformation of the line-of-sight vector (LOS) from missile body coordinates (the basic program coordinate system) to the seeker gimbal coordinate system.

Figures 2.3 and 2.4 are the block diagrams of the simplified model, Model S3, containing only the low frequency components with the high frequency blocks replaced by their appropriate gains. This simplification, in effect, neglects the small amplitude high frequency oscillations of the system which are superimposed on the more significant, lower frequency dynamics. The simplification evolved as a consequence of the very long computation time required when running Model S2. The high frequencies of 314 and 1000 rad/sec of Model S2 require a numerical integration step size of .5 millisecc, while Model S3 is integrated accurately at a step size of 12.5 millisecc. This translates directly into a factor of 25 difference in run time, and there is no significant loss of accuracy when using Model S3. In comparison runs that were made, less than three percent differences in miss distance and CEP were observed.

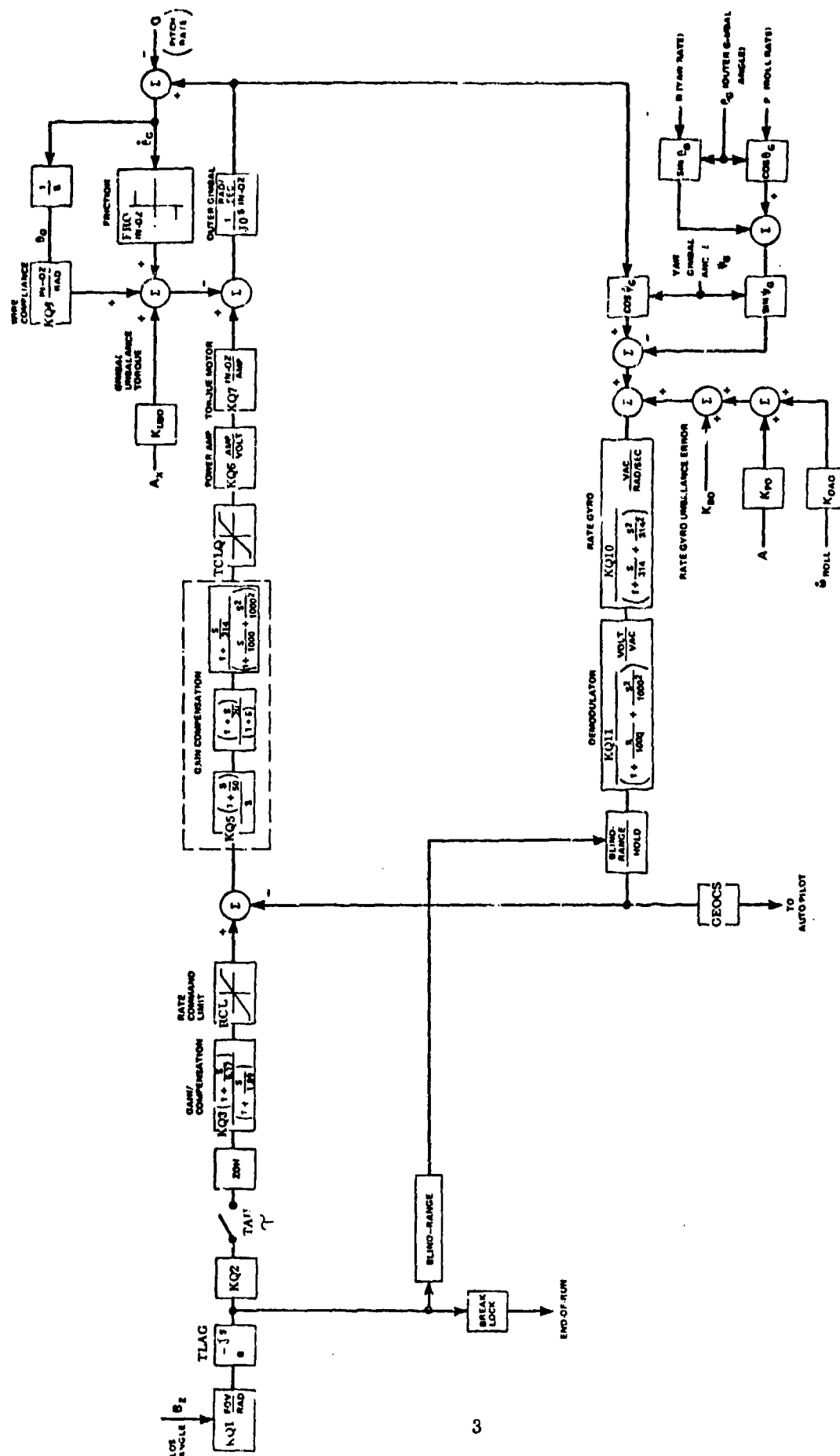


FIGURE 2.1. OCS Simulation Model (S2) - Pitch Channel

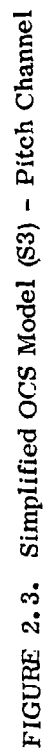


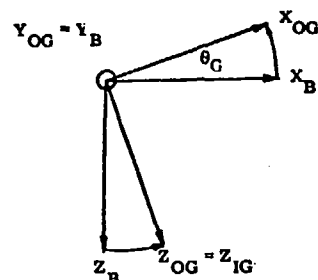
FIGURE 2.3. Simplified OCS Model (S3) - Pitch Channel

2.1 Transformation Matrix

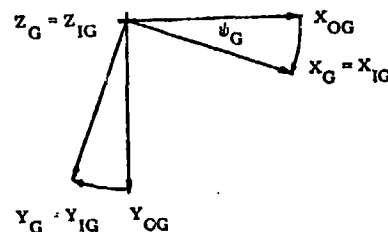
The seeker gimbal coordinate system (X_G, Y_G, Z_G) is given in Figure 2.5 with respect to the missile body coordinate system (X_B, Y_B, Z_B). The order of rotation is (1) a rotation about Y_B through the outer gimbal angle θ_G , then (2) a rotation about Z_G through the inner gimbal angle ψ_G .

The missile body-to-seeker gimbal coordinate system transformation matrix for this rotation sequence is:

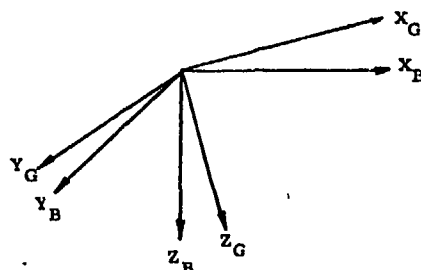
$$[M]_G = \begin{bmatrix} (\cos \theta_G \cos \psi_G) \sin \psi_G & (-\cos \psi_G \sin \theta_G) \\ (-\cos \theta_G \sin \psi_G) \cos \psi_G & (\sin \psi_G \sin \theta_G) \\ \sin \theta_G & 0 & \cos \theta_G \end{bmatrix} \quad \text{Eq. 2.1}$$



(1) First Rotation About Y_B



(2) Second Rotation About Z_{IG}



(3) Missile Body/Gimbal Coordinate System

FIGURE 2.5. Coordinate Rotation

2.2 OCS Support Models

In addition to incorporation of the pitch and yaw axis OCS models into the 6-DOF program, other critical parameter models unique to the OCS were added. These parameter models are listed below and described in the following sections:

- Gimbal friction
- Target size
- Seeker breaklock
- Seeker blind range
- Transport lag
- Helicopter induced launch transients

2.2.1 Gimbal Friction Model

Gimbal friction couples the missile angular rates to the OCS platform and may cause system degradation. Gimbal bearing pre-load and the gimbal torque motor are the main contributors of this friction which is primarily stiction (static) and coulomb. Coulomb friction is defined as a constant frictional drag which opposes motion but has a magnitude that is independent of velocity. A slight disjunction must be made between stiction and coulomb friction because, in general, the force required to initiate motion (overcome stiction) is somewhat greater than the coulomb friction. When the stiction level is identical to the coulomb friction and the system starts at rest, any applied force to the gimbal less than this value must be identically opposed so that no motion is initiated. Thus, the idealized coulomb friction model, $T_F = T_C \operatorname{sgn}(\dot{\theta}_G)$, can create a physically impossible situation where the friction model supplies energy to the system. As mentioned previously, the missile rates (angularly, accelerations or torques) are directly coupled to the platform through the effects of friction, although the coupling is limited in magnitude by the friction level.

Figure 2.6 is a block diagram representation of the pitch gimbal friction model. The opposing friction, T_F , is a function of the coulomb friction, T_C ; the net torque, T_N ; and the relative gimbal rate, $\dot{\theta}_G$. (Stiction is assumed identical to the coulomb magnitude.) The missile angular acceleration, \dot{Q} , is coupled to the platform through the function f_2 which is magnitude limited. The complete mathematical description is:

For $|\dot{\theta}_G| \leq \Delta$, where Δ is a computational dead zone and the system is considered at rest,

$$T_F = T_N \text{ Sat}(T_C) \quad \text{Eq. 2.2}$$

$$\dot{Q}_A = \dot{Q} \text{ Sat} \frac{T_F + T_C \text{ Sgn}(\dot{Q})}{J}, \text{ where } J \text{ is gimbal inertia.} \quad \text{Eq. 2.3}$$

For $|\dot{\theta}_G| > \Delta$

$$T_F = T_C \text{ Sgn}(\dot{\theta}_G) \quad \text{Eq. 2.4}$$

$$\dot{Q}_A = 0 \quad \text{where } \dot{Q}_A \triangleq f_2(T_C, T_N, \dot{Q}, \dot{\theta}_G) \dot{Q} \quad \text{Eq. 2.5}$$

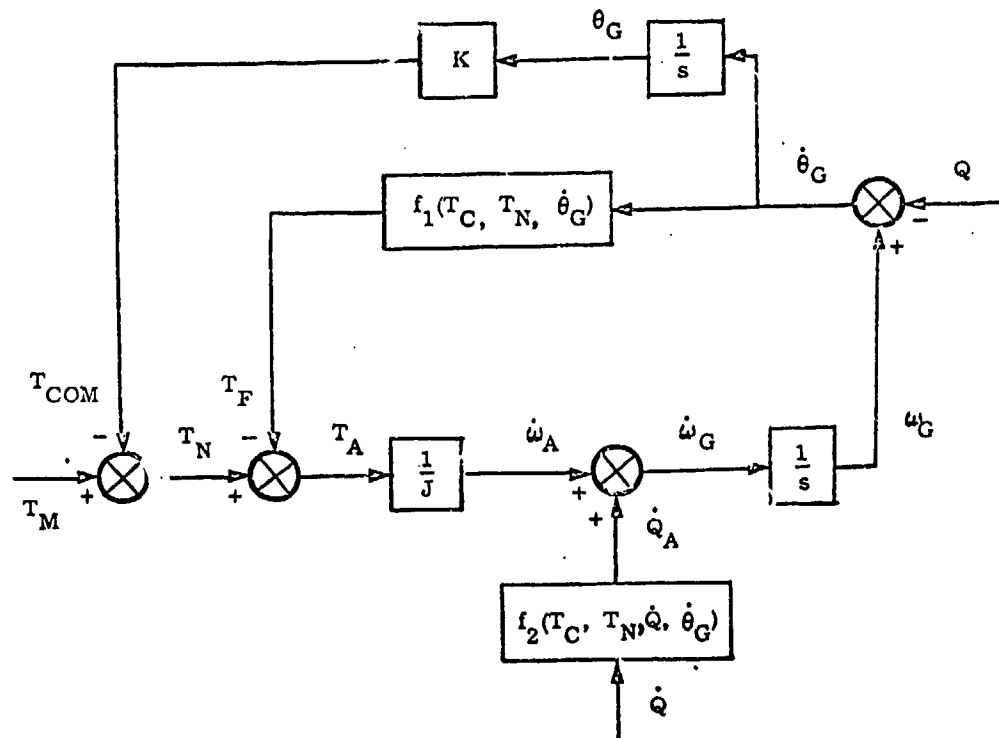


FIGURE 2.6. GIMBAL FRICTION MODEL

Figure 2.7 is a time history of the torque motor output. For this illustration, $\dot{\theta}_G$ is initially zero and θ_G is positive. To initiate motion, the torque motor had to exceed the coulomb friction level and the wire compliance torque. Figure 2.8 shows the missile acceleration, \dot{Q} , and the gimbal acceleration, $\dot{\omega}_G$. Observe that the gimbal angular acceleration tracks the missile angular acceleration until the torque motor exceeded the breakaway torque level.

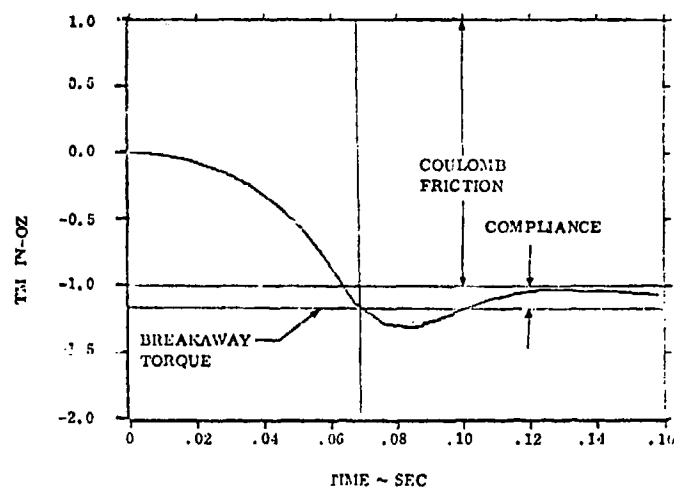


Figure 2.7. Pitch Channel Torque Motor Output

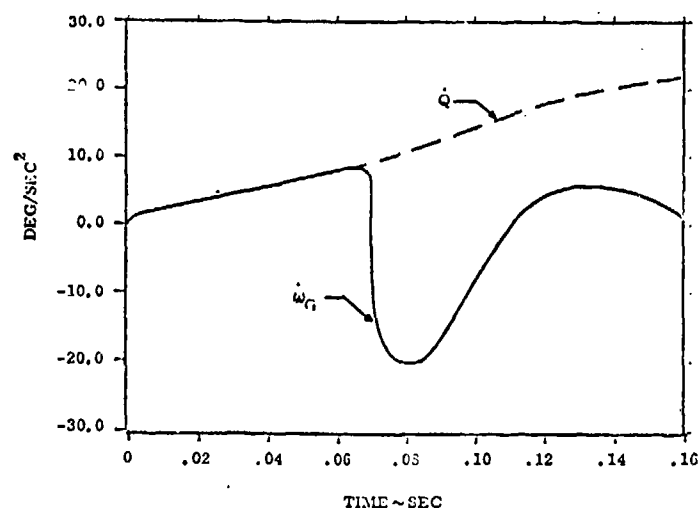


Figure 2.8. Missile Pitch and OCS Outer Gimbal Inertial Angular Acceleration

2.2.2 Target Model

A two dimensional target model was incorporated into the program for the purpose of computing seeker breaklock (Section 2.2.3) and blind range (Section 2.2.4). The dimensionality of the target does not affect any other missile or seeker parameter.

The target model is defined by the shaded area in Figure 2.9 and due to the dimensionality is restricted to be normal to the line-of-sight of the missile. The outer rectangle represents the seeker field-of-view (FOV) and the intersection of the dashed lines the instantaneous seeker aimpoint. The top and bottom of the target are always parallel to the raster lines of the vidicon screen of the seeker. Thus, for this elementary model, if the seeker rolls, the target rolls. The line-of-sight vector intersects the target at its geometric center.

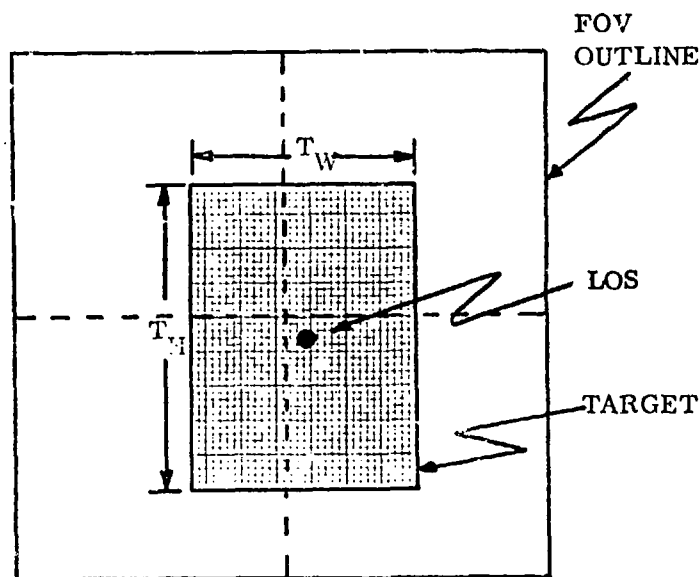


FIGURE 2.9. Target Model

2.2.3 Seeker Breaklock

Seeker breaklock (loss of target image) is assumed* to occur when seeker aimpoint shifts more than 50 percent of target height or width during one sample period, τ . Seeker aimpoint is defined as the projection of seeker boresight onto the target plane. Figure 2.10 illustrates the geometry of the breaklock parameter, aimpoint shift.

S_T is the total amount of seeker aimpoint shift over the sample period τ . S_H and S_W are the components of S_T that parallel target height T_H and width T_W , respectively. If S_H becomes greater than $.5 T_H$ or if S_W becomes greater than $.5 T_W$, it is assumed that breaklock has occurred. When breaklock does occur, the simulation run is terminated because breaklock causes loss of the missile as far as homing in on the target is concerned.

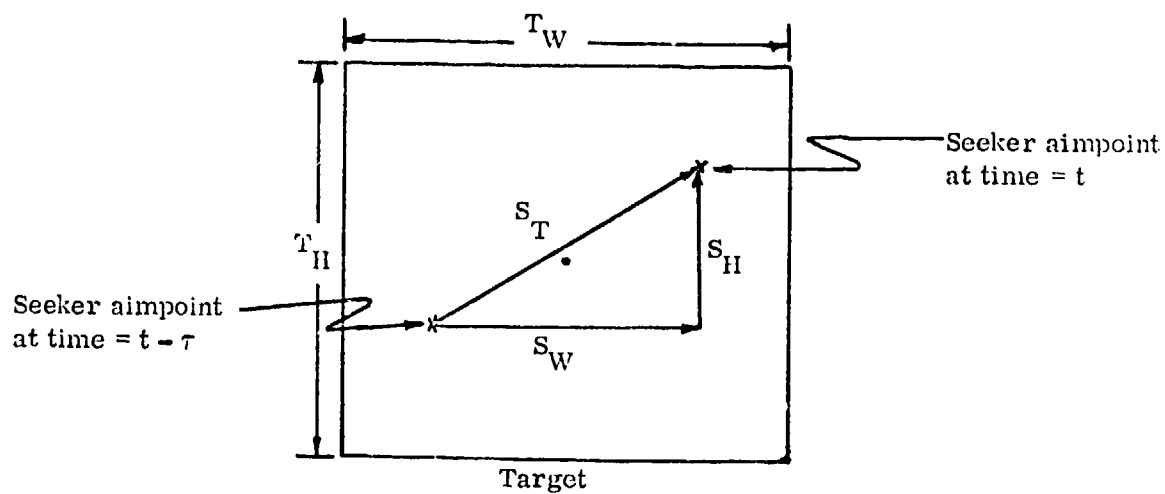


FIGURE 2.10. Seeker Aimpoint Shift

*This assumption is valid for a target-to-range ratio as low as .001.

In the simulation program, breaklock is determined from the angles subtended by the target sides/slant range and aimpoint shift/slant range. Thus, for pitch, the angle*

$$\theta_{TH} = \tan^{-1}[(T_H/2)/R] \quad \text{Eq. 2.6}$$

and the angle

$$\Delta_Z = (\beta_{Z_t} - \beta_{Z_{t-\tau}}) \quad \text{Eq. 2.7}$$

are compared at the end of each sample period, τ . If Δ_Z becomes greater than θ_{TH} , breaklock conditions are met.

The variables in the above equation are defined as:

- R - slant range
- θ_{TH} - angle subtended by slant range and one half the target height
- $\beta_{Z_{t-\tau}}$ - angle subtended by pitch plane component of LOS (S_H) and seeker boresight, one sample period back in time
- β_{Z_t} - angle subtended by pitch plane component of LOS (S_H) and seeker boresight, at the current time
- Δ_Z - angular shift of aimpoint over one sample period

When breaklock is encountered, the message below is printed out and the run is terminated. The time (seconds), range (feet from target), and the channel in which breaklock occurs is output.

```
*****
BREAK LOCK CONDITION AT TIME = .73 RANGE = 9715.04 IN PITCH
*****
```

An example of seeker aimpoint shift is given in Figure 2.11. This figure contains a time history of seeker aimpoint shift for a 1 kilometer deterministic trajectory. No errors (such as gimbal mass unbalance, launch transients, rate gyro drift, etc.) were present when this run was made. The sample period was 16.7 millisecc. The breaklock point (50 percent of

*Comparable calculations are made in the yaw plane to determine if breaklock occurs there.

target) currently in use in the simulation program is illustrated in the figure. If any of the spikes on the curve had reached the 50 percent point, the trajectory would have been terminated. As noted for this particular example, the maximum boresight shift was about ten percent.

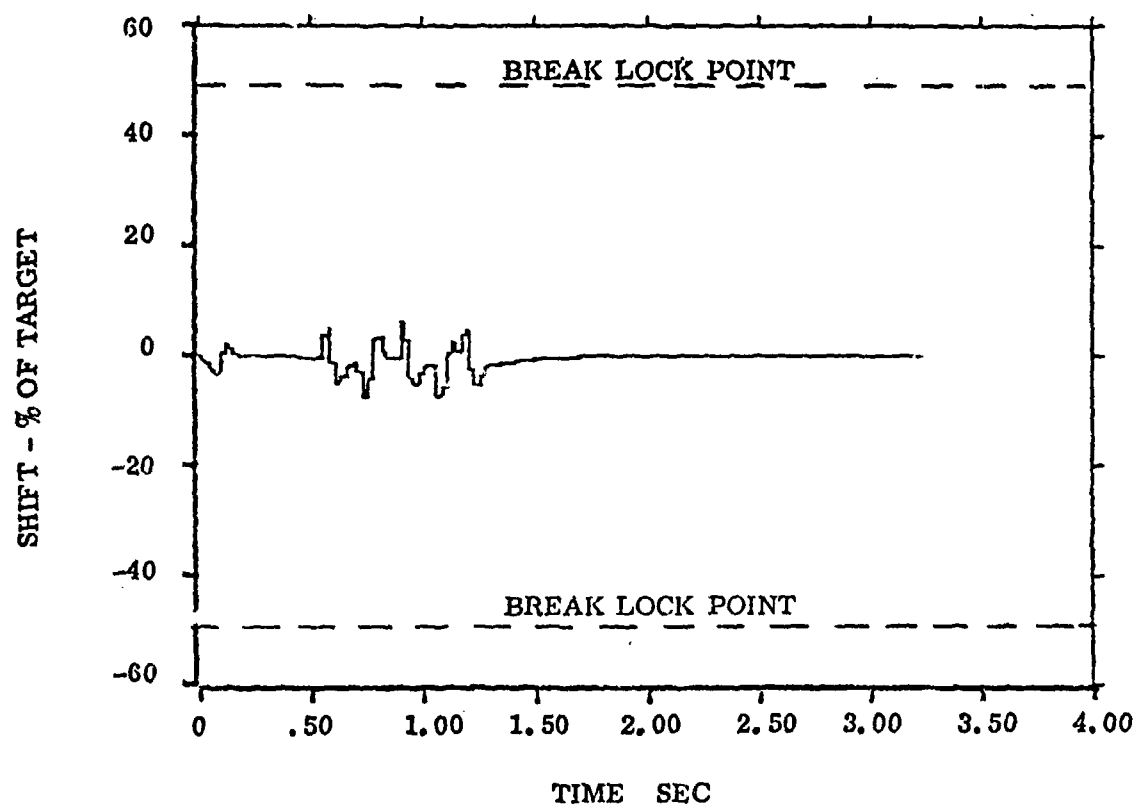


FIGURE 2.11. Seeker Breaklock Time History

2.2.4 Seeker Blind Range

Seeker blind-range is defined as the distance from the target when the target image occupies 70-80 percent of the tracker vidicon field-of-view (FOV). The actual blind-range limit is adjustable and is currently preset for 70 percent FOV.

To determine if a blind-range condition occurs, gating functions are established to check the target edges with respect to the 70 percent FOV lines as shown in Figure 2.12. However, with this implementation, blind-range is a function of the LOS angle, as well as target growth. Figure 2.13 is a time history of target edge in one axis with respect to the vidicon FOV. The general shape of the curve is due to target growth while the perturbations are caused by the LOS angle variations. The program monitors all four edges at each integration step to determine if any one edge has reached the blind-range limit. Normally, this limit is set at 70 percent FOV, but is a program variable that may be input at any desired value. When the blind-range limit has been reached, the seeker rate gyro's output signals to the autopilot are held at their present value. Thus, the missile no longer responds to commands generated by the seeker, but instead, flies into the target with the autopilot signals set at the blind-range value. In Figure 2.13, blind-range occurred at 3.01 seconds. When blind-range occurs, the following message is printed out:

```
*****
CCS BLIND RANGE SIGNAL HOLD AT TIME = 3.01 RANGE = 225.00
*****
```

Time is in seconds of flight and range is in feet from target.

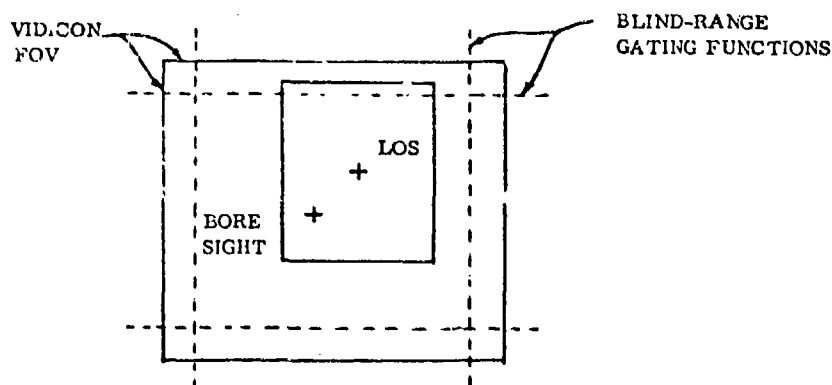


FIGURE 2.12. Blind-Range Due to LOS and Target Growth

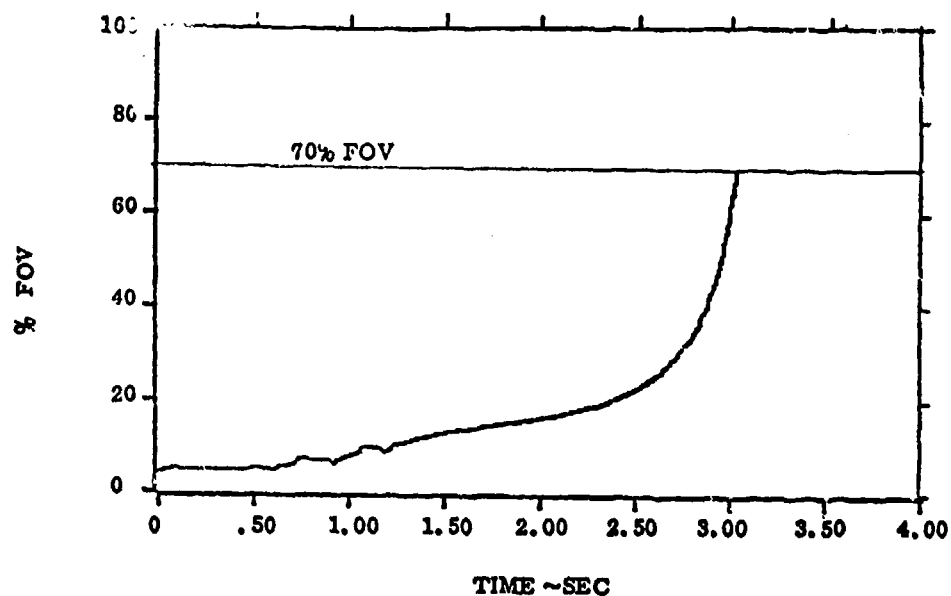


FIGURE 2.13. Target Image Growth in Seeker FOV

2.2.5 Transport Lag Implementation

The exponential, $e^{-\zeta^s}$, in the second block of each of the block diagrams of Figures 2.1, 2.2, 2.3, and 2.4 represents a transport lag in the camera of the OCS. The actual phenomena that this term models is unknown at the present; however, it closely approximates the effects required to match OCS subsystem test data. Implementation of this lag was accomplished as follows:

- The last six time points of the LOS angle (BZ and BY) are stored in a storage array.
- A table look up function interpolates linearly within the stored values to return the values of BZ and BY at the lag time (TIME - TLAG).
- The interpolated values of the LOS angles are then used by the OCS model as the target position for guidance calculations.

2.2.6 Launch Transients

Missile pitch, yaw, and roll launch transients caused by helicopter vibration and launcher rail/missile shoe interaction were modeled because these transients could severely affect the condition of seeker breaklock. Typical launch transient data from which the models were developed are given in reference 3. Examination of this data reveals that pitch and yaw characteristics are similar. Thus, pitch and yaw perturbations are simulated from similar transient models. Roll transients are presented as plots of roll angle versus time. Roll transients appear to exhibit different characteristics from those of pitch and yaw, thus roll is modeled separately. An example of the plots as presented in reference 3 is given in Figure 2.14.

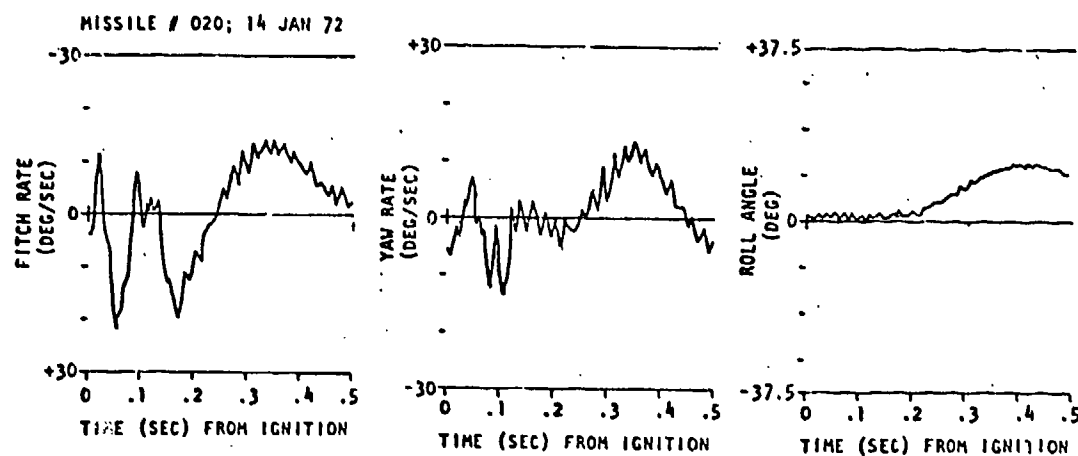


FIGURE 2.14. Typical Launch Transients

In addition to the data of reference 3, telemetry data relating to pitch and yaw, in the form of undocumented strip charts for pitch and yaw rates and a power spectral density (PSD) plot of rate-gyro output in pitch, were available to aid in model development. These telemetry data were taken from a captive flight test of the anti-tank missile mounted on a helicopter launcher. A reproduction of the PSD is shown in Figure 2.15.

2.2.6.1 Pitch, Yaw, and Roll Models

2.2.6.1.1 Pitch Model

In modeling the pitch launch transients, the helicopter vibration was assumed to be a pitching moment applied to the launch rail and coupled to the missile through the rail shoes. Since the power spectral density (PSD) of the pitch rate gyro output, Figure 2.15, has distinct frequencies; the pitching moment was modeled as a harmonic forcing function and is applied until the rear shoe exits the launch rail (tip-off point). The forcing function is defined as:

$$F(t) = A_m \cdot e^{-\frac{t}{A_e}} \cdot \sum_{i=1}^n A_i \sin(\omega_i t + \phi_i) \quad \text{Eq. 2.8}$$

where

- ω_i - frequency ($2\pi f_i$)
- ϕ_i - phase angles initialized randomly from a 0 to 2π
uniform distribution
- A_i - peak amplitudes
- A_e - time constant which spreads the PSD about
the discrete frequencies
- A_m - scale factor

The relationships between the peak amplitudes, A_i , were determined by comparing the peak amplitudes of the PSD at the desired frequencies. However, these values are the pitch rate densities in $(\text{rad/sec})^2/\text{hz}$ and need to be related to the equivalent autocorrelation values. Since the autocorrelation function, $R(0)$ is related to the PSD by

$$R(0) = \int_{-\infty}^{\infty} \text{PSD}(f) df$$

HELL-FIRE - PSD, R.F.I., Flight Test
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Plate 1 (continued)

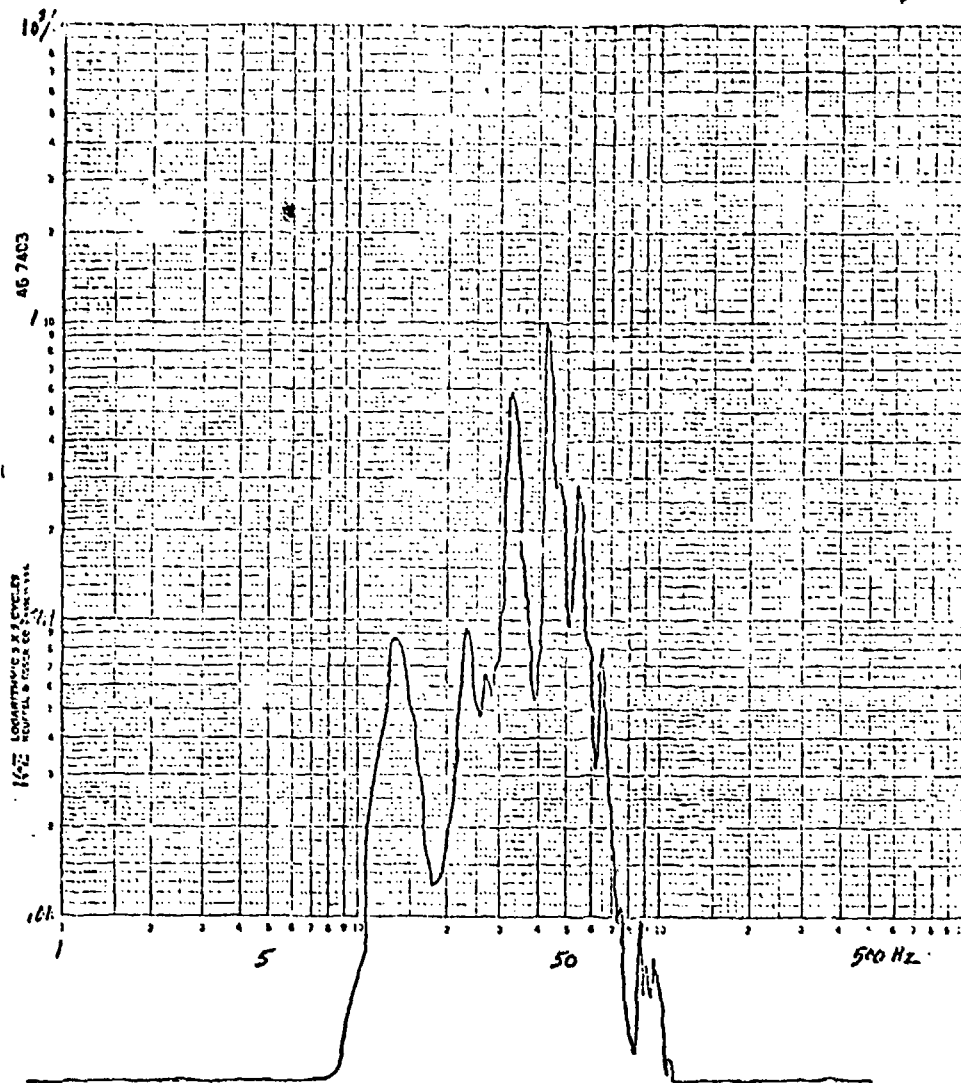


FIGURE 2.15. Power Spectral Density of Rate Gyro Output-Helicopter Mounted Captive Flight Test

It can be shown that with an ideal bandpass filter of bandwidth, BW, we can relate the autocorrelation values, A_i , to the PSD values, B_i , by

$$A_i^2 = BW \cdot B_i$$

Using the first four ($n = 4$) predominant frequencies of the PSD given in Figure 2.15

$$f_i = \{11, 22, 33, 44\}$$

and their peak values

$$B_i = \{.085, 0.10, 0.56, 1.0\}$$

the autocorrelation values are calculated with $BW = 500$ hz as

$$A_i = \{6.5, 6.7, 16.7, 22.4\}$$

Using the time constant, $A_e = -1$, to spread the spectral densities about each frequency, the scale factor, A_m , was determined by calculating* the autocorrelation function, Figure 2.16, of the simulation rate gyro output signal and comparing it to the telemetry PSD, Figure 2.15. A reasonable match was obtained with all the telemetry data with

$$A_m(\text{pitch}) = 10 \text{ FT-LBS}$$

and

$$A_i = \{1, 4, 12, 26\}.$$

Example time histories of $F(t)$, the pitch rate, and the rate gyro output are shown in Figure 2.17, 2.18, and 2.19, respectively. The missile was constrained to the launch rail for these runs.

An example of a pitch rate time history of the missile (not constrained to the rail) for the first one-half second of flight is given in Figure 2.20. Front shoe exit time is .086 seconds and rear shoe exit time (tip-off time) is .112 seconds.

2.2.6.1.2. Yaw Model

The pitching moment forcing function and coefficients were assumed applicable for yaw. The peak amplitude, A_m , of yaw moment was determined in similar manner as pitch. $A_m(\text{yaw})$ was adjusted to give a reasonable match between the peak-to-peak yaw rates of the simulation program and the peak-to-peak rates given in reference 3. An example of a yaw rate time

* The autocorrelation function was calculated with the Time Series Analysis Program (TSAP), Reference 4.

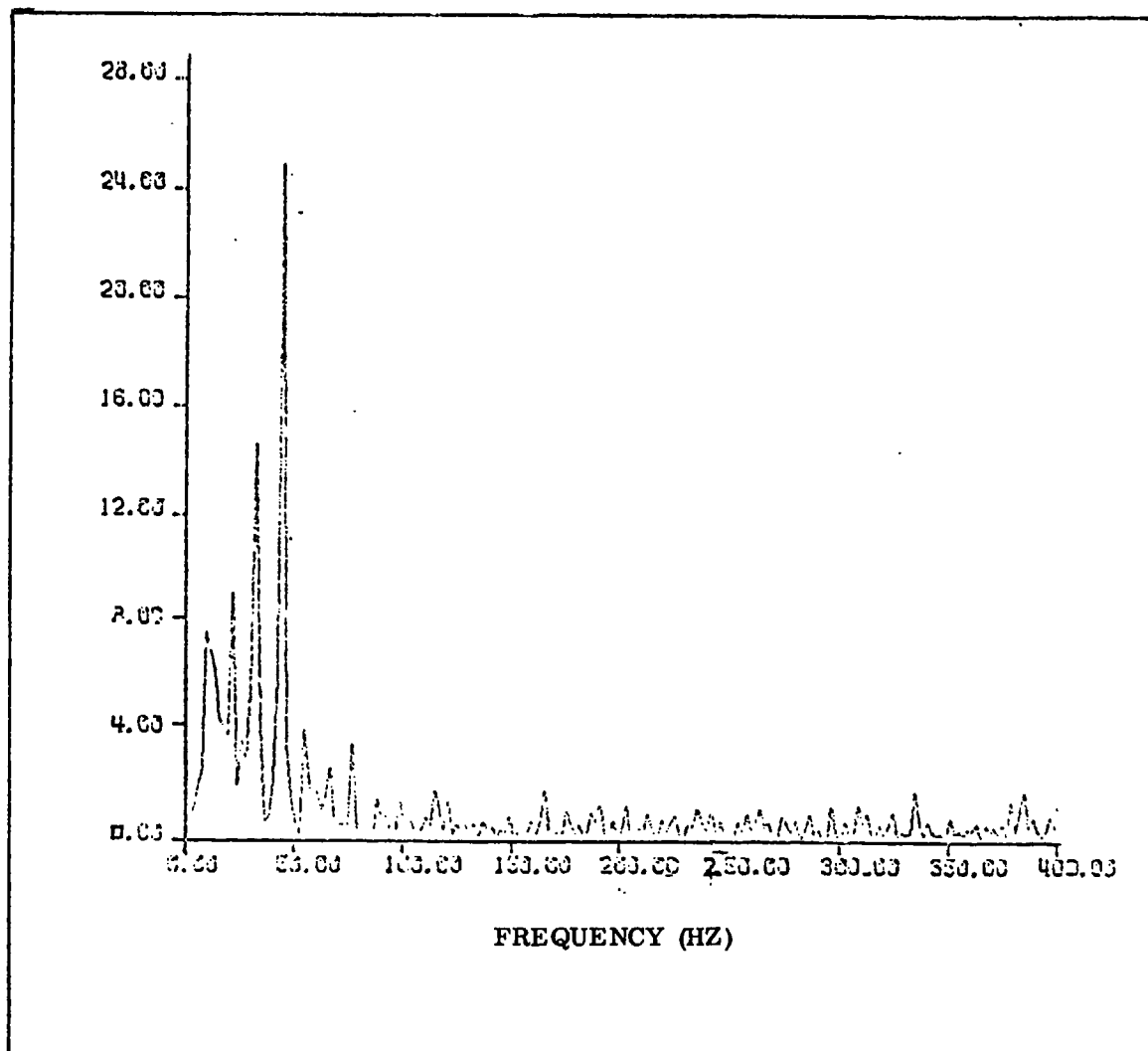


Figure 2.16. Autocorrelation Function of Rate
Gyro Output - Simulation Model

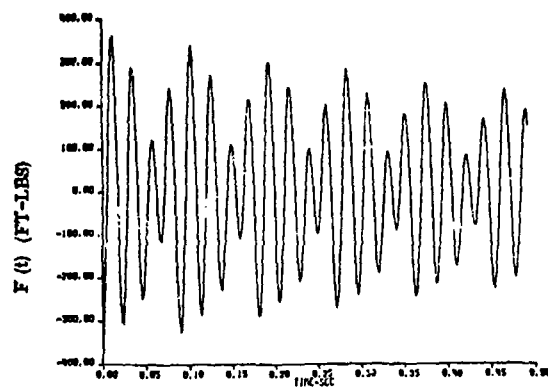


FIGURE 2.17. Moment Forcing Function Time History

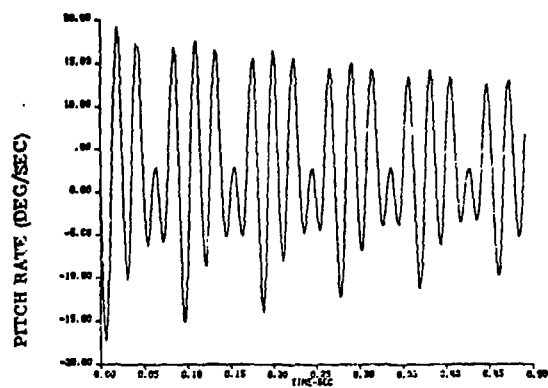


FIGURE 2.18. Pitch Rate Time History

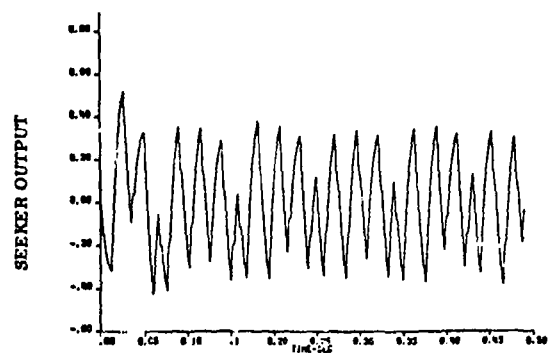


FIGURE 2.19. Output to Autopilot Time History

history is given in Figure 2.21. The best value obtained for the yaw rate amplitude coefficient was:

$$A_m(\text{yaw}) = 4 \text{ FT-LBS.}$$

2.2.6.1.3. Pitch and Yaw Rate Initialization

As long as the missile is on the launch rail and the pitch and yaw moments are being applied, the pitch and yaw rates are directly proportional to the integral of $F(t)$. Integrating $F(t)$ results in the following equation, $H(t)$.

$$H(t) = A_m \cdot e^{A_e t} \cdot \sum_{i=1}^n \left\{ \frac{A_i}{A_e^2 + \omega_i^2} \cdot [A_e \sin(\omega_i t + \phi_i) - \omega_i \cos(\omega_i t + \phi_i)] \right\} \quad \text{Eq. 2.9}$$

The proportionality constants for pitch and yaw are the moments of inertia about the appropriate rotational axes. Thus,

$$\omega_Q = \frac{H(t)_Q}{I_Y} \quad \text{Eq. 2.10}$$

$$\omega_R = \frac{H(t)_R}{I_Z} \quad \text{Eq. 2.11}$$

where

- $H(t)_Q$ - refers to the pitch rate equation
- $H(t)_R$ - refers to the yaw rate equation
- I_Y - moment of inertia about Y axis
- I_Z - moment of inertia about Z axis

Equations 2.10 and 2.11 are solved at time = 0 to determine the correct initial values of pitch and yaw rate so that the time functions of pitch and yaw are in phase with the moment time function $F(t)$. (This is equivalent to solving for the constant of integration of a differential equation.) Pitch and yaw rates are not determined by Eq. 2.10 and 2.11 except for initialization. Instead, the forcing function $F(t)$ is numerically integrated along with all other differential equations in the program.

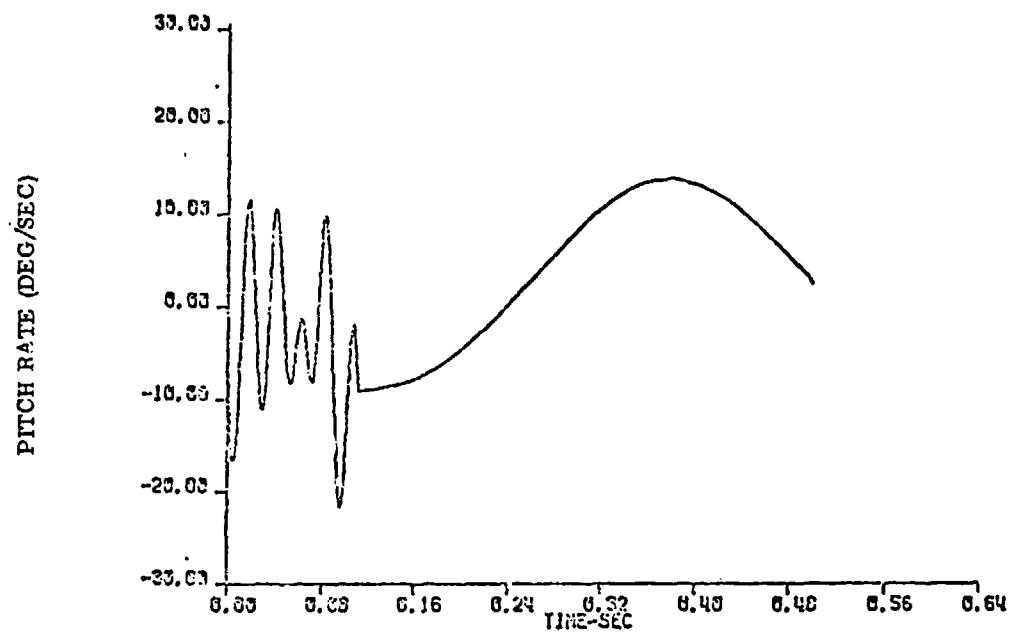


FIGURE 2.20. Simulation Model Pitch Launch Transient

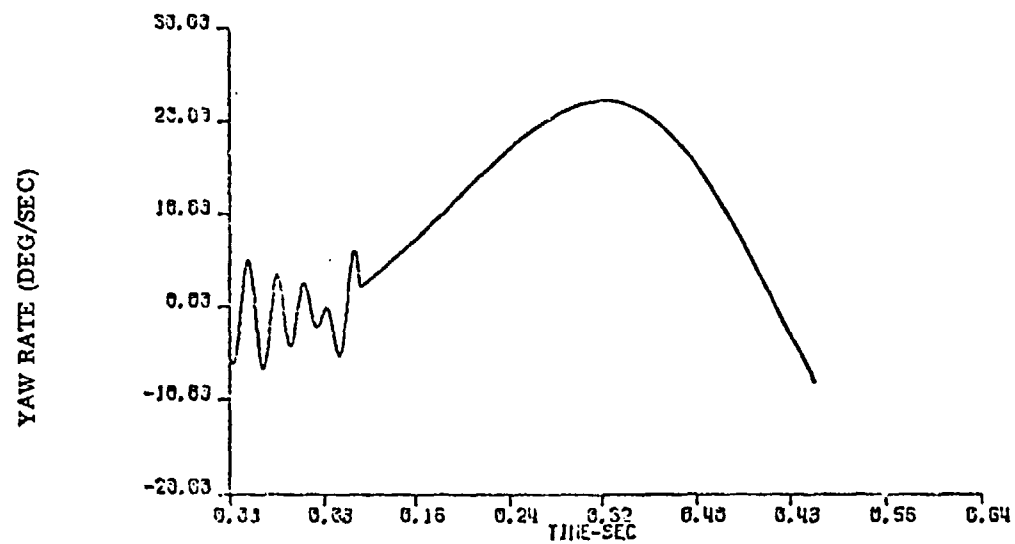


FIGURE 2.21. Simulation Model Yaw Launch Transient

2.2.6.1.4 Roll Model

Roll transients were modeled based solely on the data given in reference 3. No additional data on roll was available. All roll data plotted in reference 3 is given in roll angle; however, as with pitch and yaw, the roll transient was modeled as a roll moment. A roll moment model was developed that produced roll angles that matched typical roll angle characteristics as given in the reference.*

Examination of the slopes of the plots of reference 3 reveal that for all practical purposes, roll rate is zero until the front shoe exits the launch rail. Roll rate then begins to build up until a maximum roll angle is reached between .3 and .4 seconds. Once off the rail, roll angle varies about a mean value established when the autopilot gyros were uncaged. The oscillation about this mean is caused by the roll stabilization system.

The roll transient model developed assumes a zero roll rate and a zero roll acceleration (zero moment applied) until front shoe exits the launch rail, as shown in Figure 2.22. Following front shoe exit, a roll moment (F_{MX}) is computed based on the difference between front and rear shoe exit times (Δt) and the desired rear shoe exit roll rate (tip-off roll rate, ω_{PTO}), or:

$$F_{MX} = (\omega_{PTO} \cdot I_X) / \Delta t \quad \text{Eq. 2.12}$$

where I_X is the moment of inertia about the longitudinal axis and ω_{PTO} is specified by the user. The exit time difference (Δt) is .026 sec for this missile simulation.

The roll moment (F_{MX}) is applied to the missile from the time of front shoe exit to the time of rear shoe exit. Integration of the roll acceleration due to F_{MX} results in the tip-off roll rate ω_{PTO} . Immediately following rear shoe exit, all transient models are zeroed out and the simulation reverts to 6-DOF guided flight. An example roll angle time history resulting from this model is shown in Figure 2.23.

* Modeling of roll transients is critical because of the interaction between seeker breaklock and roll acceleration. Seeker breaklock is influenced by roll acceleration through the roll coupling term of the seeker rate gyro output axis. This output axis is directed along the roll axis of the missile.

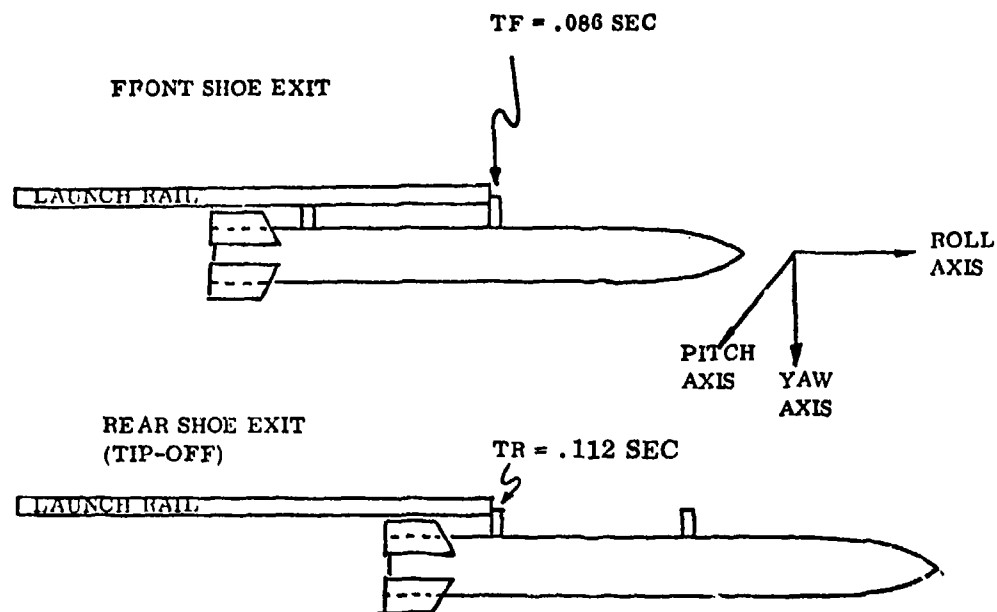


FIGURE 2.22. Launcher/Missile Configuration

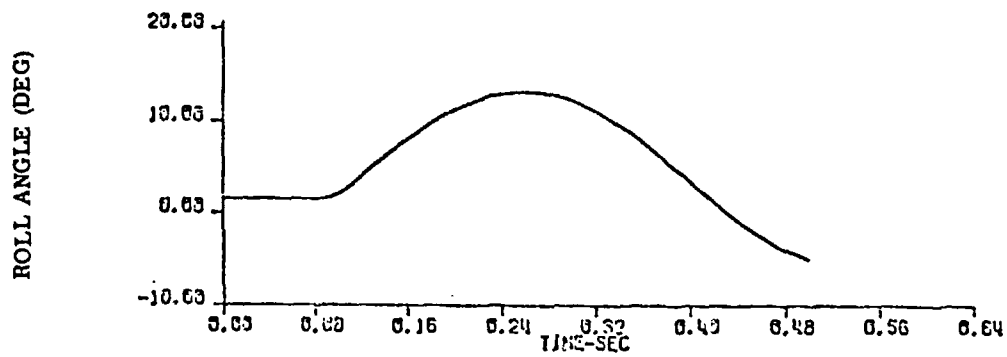


FIGURE 2.23. Simulation Model Roll Launch Transient

2.3 Input Variable Description

2.3.1 OCS Input Variable Description

The following list identifies all variables of the OCS seeker subroutines (S2 and S3) that can be input by 3-cards.* Variable names beginning with K are the gains shown in the block diagrams of Figures 2.1 and 2.2. Variable names beginning with W are the frequency components given in Figures 2.1 and 2.2. The frequency variable names themselves do not appear in the figures. Instead, actual frequency values are shown. However, these variables may still be input by 3-cards. The variable name and its position in the block diagram can be correlated by the frequency values tabulated below in the second column.

FORTTRAN SYMBOL	SYMBOL USED IN TEXT	C INDEX	DEFINITION
KQ1	KQ1	545	PITCH CHANNEL GAINS
KQ2	KQ2	547	
KQ3	KQ3	549	
KQ5	KQ5	551	
KQ6	KQ6	553	
KQ7	KQ7	555	
KQ8	KQ8	557	
KQ10	KQ10	559	
KQ11	KQ11	561	
KQ12	KQ12	563	
KR1	KR1	546	YAW CHANNEL GAINS
KR2	KR2	548	
KR3	KR3	550	
KR5	KR5	552	
KR6	KR6	554	
KR7	KR7	556	
KR8	KR8	558	
KR10	KR10	560	
KR11	KR11	562	
KR12	KR12	564	

Input description continued on next page.

* See reference 1 for definition and use of 3-cards.

FORTRAN SYMBOL	SYMBOL USED IN TEXT	C INDEX	DEFINITION
WTQ1	6.17	573	PITCH CHANNEL FREQUENCIES
WTQ2	1.89	575	
WQQ1	50.	577	
WQQ3	20.	581	
WQQ4	1.	583	
WQO5	314.	585	
V GQ6	1000.	587	
WRQ2	314.	591	
WRQ4	1000.	595	YAW CHANNEL FREQUENCIES
WTR1	6.17	574	
WTR2	1.89	576	
WGR1	50.	578	
WGR3	20.	582	
WGR4	1.	584	
WGR5	314.	586	
WGR6	1000.	588	
WRR2	314.	592	Rate command limit in pitch and yaw Torque command limit in pitch Torque command limit in yaw Moment of inertia of inner gimbal Moment inertia of outer gimbal Rate gyro gain to autopilot, pitch and yaw Inner gimbal friction coefficient (in-oz) Outer gimbal friction coefficient (in-oz) Blind range decimal percent field of view Target height (ft) Target width (ft) Seeker sample period (sec) OCS transport lag (sec)
WRR4	1000.	596	
RCL	RCL	597	
TCLQ	TCLQ	598	
TCLR	TCLR	599	
JI	JI	565	
JO	JO	566	
GEOCS	GEOCS	497	
FRI	FRI	567	
FRO	FRO	568	
FFOV	FFOV	604	
TARHT	T _H	601	
TARWD	T _W	602	
TAU	τ	600	
TLAG	ζ	606	

2.3.2 Launch Transient Input Variable Description

A new subroutine, LTRAN, was added that contains the pitch and yaw moment forcing function, $F(t)$, and the pitch and yaw initialization function, $H(t)$. This subroutine is called by subroutine A3I for initialization of the rates and by subroutine A2 to compute the time varying rates.

The roll transient model is also initialized in subroutine A3I. Subroutine A2 contains the logic for integration of the roll acceleration computed in A3I.

The following list identifies all variables of the launch transient models that are input by 3-cards.

FORTTRAN SYMBOL	SYMBOL USED IN TEXT	C INDEX	DEFINITION
WPTO	ω_{PTO}	1738	Tip-off roll rate (deg/sec)
AMP2	A_m	1742	Peak amplitude of pitch moment forcing function (ft/lbs)
AMP1	A_m	1746	Peak amplitude of yaw moment forcing function (ft/lbs)
VIB		626	Launch transient vibration flag (pitch and yaw only) 0 - no vibration 1 - run with vibration

3.0 RANDOM ERROR SOURCES

Initial condition random error sources specified as probability distributions unique to the OCS or impacting the operation of the OCS are listed below and described in the following sections.

1. Seeker Platform Mass Unbalance
 - Outer gimbal
 - Inner gimbal
2. Seeker Rate Gyro Errors
 - Drift
 - Mass Unbalance
 - Output axis/missile roll coupling
3. Launch Transient-Rate Distributions
 - Pitch and yaw rate
 - Roll rate

3.1 Error Source Distribution

3.1.1 Seeker Platform Mass Unbalance

Error randomization of seeker platform mass unbalance was added to the simulation program for both inner and outer gimbals of the seeker head. Missile acceleration normal to the gimbal plane acts on this mass unbalance to create a torque that attempts to rotate the seeker head, thus generating an error signal. The seeker torque motor must then compensate for this error.

Figure 3.24 illustrates the mass unbalance geometry of the outer gimbal ring. The centroid of mass unbalance is assumed to have an equal likelihood of lying at any point in the gimbal plane, while the mass unbalance magnitude (K_{UBO}) distribution must be specified by the user. Since mass unbalance magnitude includes the moment arm as well as the normalized force acting on the moment arm, the actual radius on which the mass unbalance lies is unimportant, except as to whether the resulting torque causes a clockwise or counter-clockwise rotation about the gimbal axis. Thus, following the selection of the mass unbalance magnitude from a specified distribution, the sign of the mass unbalance is selected from the uniform distribution shown in Figure 3.25. The torque acting about the outer gimbal axis is then:

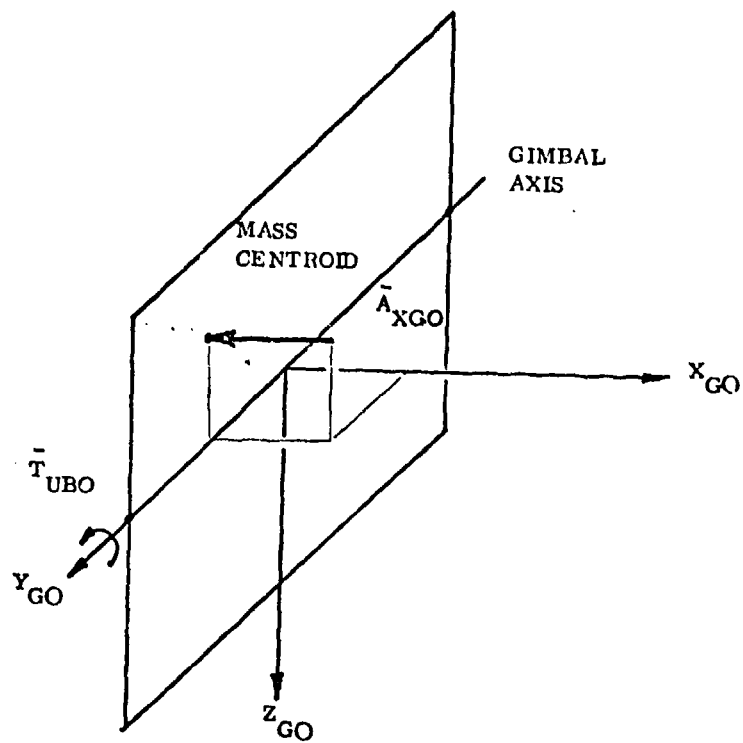


FIGURE 3.24. \bar{Q} Seeker Outer Gimbal Mass Unbalance

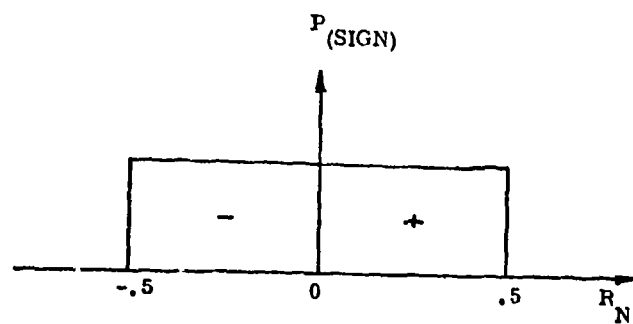


FIGURE 3.25. Probability Distribution of Mass Unbalance Sign

$$\bar{T}_{UBO} = A_{XGO} \cdot K_{UBO} \cdot \text{SGN}(\text{RN}) \quad \text{Eq. 2.13}$$

The total acceleration,

$$\bar{A}_T = [A_{XB}, A_{YB}, A_{ZB}] \quad \text{Eq. 2.14}$$

acting on the missile is resolved through the outer gimbal angle (θ_G) to get the acceleration component (A_{XGO}) normal to the gimbal plane. Thus, from Figure 3.26,

$$A_{XGO} = A_{XB} \cos \theta_G - A_{ZB} \sin \theta_G. \quad \text{Eq. 2.15}$$

Since the outer gimbal rotates about the y-axis (Y_B) of the missile, only the acceleration components along missile x-axis (X_B) and z-axis (Z_B) act on the gimbal plane.

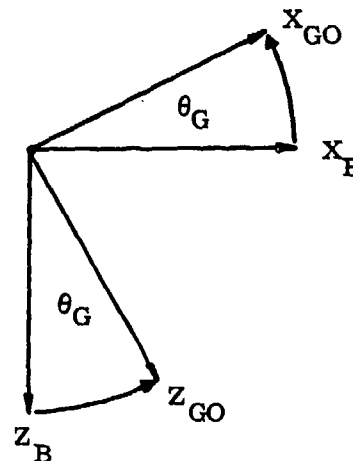


FIGURE 3.26. Gimbal Rotation About Missile Y-Axis

The inner gimbal mass unbalance centroid is somewhat more complex to locate because the inner gimbal mass is more complex in shape as shown in Figure 3.27.

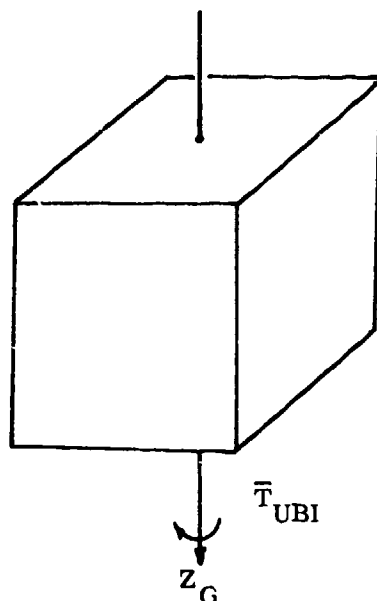


FIGURE 3.27. Inner Gimbal Mass

As with the outer gimbal, the distribution of the mass unbalance magnitude (K_{UBI}) is user specified, while the plane in which the centroid lies is assumed to have an equal likelihood of being oriented at any angle (χ), as shown in Figure 3.28. The angle χ is selected from the uniform distribution shown in Figure 3.29. The resulting torque acting about the inner gimbal axis is then,

$$\bar{T}_{UBI} = K_{UBI} (A_{YG} \cos \chi - A_{XG} \sin \chi) \quad \text{Eq. 2.16}$$

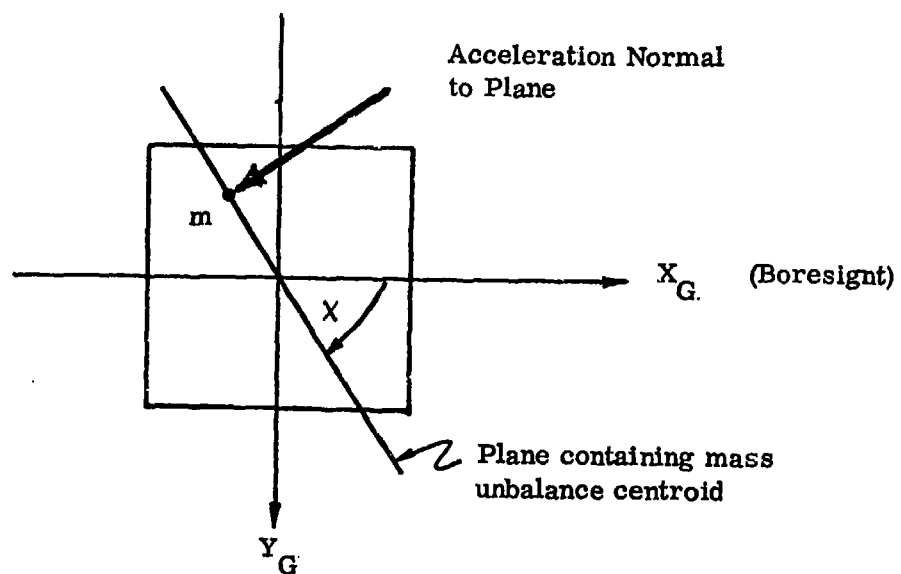


FIGURE 3.28. Inner Gimbal View Looking Down the Z-Axis

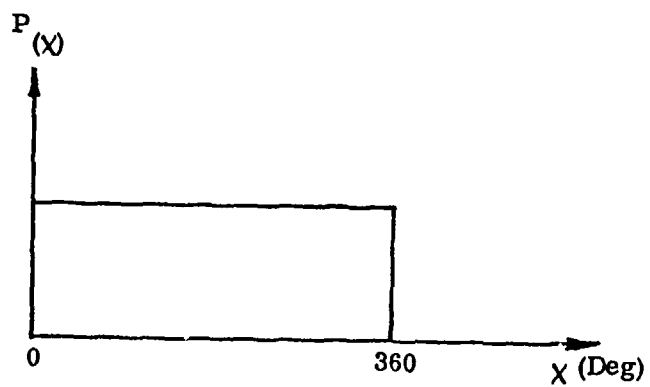


FIGURE 3.29. Probability Distribution of Mass Unbalance Radial Position

The acceleration components (A_{YG} and A_{XG}) in the inner gimbal coordinate system are determined by transforming the total acceleration (\bar{A}_T) through the gimbal angles (θ_G and ψ_G), thus

$$\begin{bmatrix} A_{XG} \\ A_{YG} \\ A_{ZG} \end{bmatrix} = [M]_G \begin{bmatrix} A_{XB} \\ A_{YB} \\ A_{ZB} \end{bmatrix} \quad \text{Eq. 2.17}$$

The transformation matrix $[M]_G$ is derived in Section 2.1.

Mass unbalance magnitude distributions are normalized with respect to acceleration. Thus, mass unbalance has the units of IN-OZ per g of acceleration. All acceleration components seen in the preceeding equations are also normalized.

3.1.2 Seeker Rate Gyro Errors

The seeker rate gyros can produce errors that perturb and bias the tracker rate loops and degrade the performance of the OCS seeker. Therefore, the primary errors sources of these rate gyros were included in the simulation program for study. Gyro errors (or more correctly, gyro error torques) can arise from a variety of different sources and are usually expressed as equivalent gyro drift rates.

Constant gyro drift rates result from uncompensated bias torques, L_ϵ , and their magnitude is usually a measure of the gyro quality. Acceleration sensitivity is primarily a function of the mass unbalance about the gyro output axis, i.e., the center of mass not coincident with the output axis. Linear accelerations, A , normal to the output axis produce gyro drift rates proportional to the acceleration.

The last gyro error source to be considered is a characteristic due to the inertia of the gyro float assembly. Angular accelerations about the output axis, $\dot{\omega}_{OA}$, cause gyro pick-off angle errors, which in turn torque the gyro through the electronic caging loop resulting in a gyro drift rate. Thus, the total gyro error rate is

$$\omega_\epsilon = \frac{L_\epsilon}{H} + \frac{P}{H} A + \frac{J_{OA}}{H} \dot{\omega}_{OA} \quad \text{Eq. 2.19}$$

where H is the angular momentum of the rotor, P is the pendulosity, and J_{OA} is the moment of inertia of the floated assembly about its output axis.

The OCS platform has two stabilizing rate gyros mounted to sense inertial rates in the pitch and yaw axes. These rate gyros are so mounted that their output axes are aligned with the platform roll axis. Therefore, from Eq. 2.19, the error rate for the pitch gyro is

$$\omega_{\epsilon O} = K_{BO} + K_{PO} A + K_{OAO} \dot{\omega}_{ROLL} \quad \text{Eq. 2.20}$$

and for the yaw gyro

$$\omega_{\epsilon I} = K_{BI} + K_{PI} A + K_{OAI} \dot{\omega}_{ROLL} \quad \text{Eq. 2.21}$$

The coefficients in Eqs. 2.20 and 2.21 are user specified by their distribution functions. Since the gyro pendulosity, K_p , has an equal likelihood of occurring anywhere about the gyro output axis, its location is picked from a uniform distribution prior to each run.

3.2 Probability Distribution Input Description

3.2.1 OCS Monte Carlo Input Variables

The variables associated with the Monte Carlo seeker models are given below. The mean values of these variables are input by 3-cards and the probability distributions are input by 8-cards.
**

Program Variable Name of Error Source	C Index of Error Source	Program Module Calling MCARLO	MCARLO Flag*		Definition
			Name	Index	
KUO	611	S2I		611	Outer gimbal mass unbalance (in-oz/g)
KUI	612	S2I		612	Inner gimbal mass unbalance (in-oz/g)
KBO	613	S2I		613	Outer gimbal drift rate (deg/sec)
KBI	614	S2I		614	Inner gimbal drift rate (deg/sec)
KPO	615	S2I		615	Outer gimbal pendulosity coefficient (deg/sec/g)
KPI	616	S2I		616	Inner gimbal drift rate (deg/sec/g)
KOAO	617	S2I		617	Outer gimbal output axis/roll coupling coefficient (sec)
KOAI	618	S2I		618	Inner gimbal output axis/roll coupling coefficient (sec)

*MCARLO is flagged by the C-Index of this variable in the calling module.

When MCARLO is flagged by this C-Index, a random number will be returned from MCARLO for the error source in the first column.

** See reference 2 for definition of 8-cards.

3.2.2 Launch Transient Monte Carlo Input Variables

The variables associated with the Monte Carlo launch transient models are given below. An 8-card is used to select any one of these models (roll, pitch or yaw) as a Monte Carlo variable. Roll is the only one of the three that requires specification of a probability distribution on the 8-card. The pitch and yaw models do require 8-cards; however, the probability distribution input fields are left blank because pitch and yaw are randomized indirectly, as explained in Section 2.2.6.

A mean value of roll rate (WPTO) is input by 3-card. Mean values of pitch and yaw rate are not input, because the mean and distribution of these two variables are determined from solution of the forcing function, $F(t)$, Eq. 2.8. However, the peak amplitude of pitch (AMP2) and yaw (AMP1) moment (due to helicopter vibration) must be input by 3-card. In addition, the flag, VIB, defined in Section 2.3.2 must be input equal to 1.

Program Variable Name of Error Source	C Index of Error Source	Program Module Calling MCARLO	MCARLO Flag*		Definition
			Name	Index	
WPTO	1738	A3I, A2		1738	Mean tip-off roll rate (deg/sec)
AMP2	1742	A3I, A2		1742	Peak amplitude of pitching moment forcing function (ft/lbs)
AMP1	1746	A3I, A2		1746	Peak amplitude of yawing moment forcing function (ft/lbs)

*MCARLO is flagged by the C-Index of this variable in the calling module.

When MCARLO is flagged by this C-Index, a random number will be returned from MCARLO for the error source in the first column.

3.2.3 Pitch and Yaw Randomization Independent of Launch Transient Model

Pitch and yaw tip-off rates may be randomized from an input probability distribution by inputting the C-indices of pitch and yaw rate on an 8-card. This capability was added as an option to directly randomize as opposed to indirectly randomizing pitch and yaw rates as mentioned above. Use of this option will generate instantaneous changes in pitch and yaw rate at time of rear shoe rail exit. This option was added primarily to allow randomization of pitch and yaw rates for launch from a tower or ground vehicle in which there are no launcher vibrations. However, this option can be exercised simultaneously with the vibration model above. Roll rate randomization described above applies equally to helicopter or ground launchers.

Program Variable Name of Error Source	C Index of Error Source	Program Module Calling MCARLO	MCARLO Flag*		Definition
			Name	Index	
WQ	1743	A2		1743	Pitch rate (deg/sec)
WR	1747	A2		1747	Yaw rate (deg/sec)

*MCARLO is flagged by the C-Index of this variable in the calling module.

When MCARLO is flagged by this C-Index, a random number will be returned from MCARLO for the error source in the first column.

4.0 COMPUTER PROGRAM DESCRIPTIONS

4.1 New Subroutines

The basic structure of the 6-DOF Monte Carlo program remains unchanged. Modifications and minor alterations were made to incorporate the OSC subroutines and all related models. Four new subroutines were created and minor changes in other subroutines were made to interface the new subroutines with existing program structure. The new subroutines added are:

1. LTRAN - pitch and yaw helicopter vibration subroutine containing Eq. 2.8, the moment forcing function, and Eq. 2.9, the rate initialization function.
2. S2I - OCS initialization subroutine. This subroutine initializes values for both OCS models, S2 and S3. (S2I contains an entry point, S3I, that initializes variables pertinent to S3.)
3. S2 - The derived OCS model subroutine, which contains both high and low frequency components.
4. S3 - The simplified OCS model subroutine, consisting of only the low frequency components.

Input variables for the OCS model and all related models are defined following the sections that describe those particular models.

Seeker subroutine selection is made by use of the 2-cards*. Care must be exercised when changing 2-cards, because, as explained in reference 1, the order in which 2-cards are input determines the order in which all missile and environment subroutines are called.

4.2 Monte Carlo Runs With Breaklock

Flights that breaklock are terminated when breaklock occurs. This, of course, impacts the Monte Carlo operation of the simulation program. Dropping the run from the run set reduces the number of miss distance values that will be used to compute statistical information such as mean, standard deviation and CEP; and this in turn reduces the confidence level of the statistical data. To alleviate this degradation in confidence level, additional runs are

*See reference 1 for definition of 2-cards.

automatically added to a run set to make up for runs terminated due to breaklock. However, a limit of five additional runs is built into the program to avoid ad infinitum runs (or until computer run time limit is reached) due to the occurrence of a very large percentage of breaklock flights.

At the completion of a run set, and prior to printing out CEP data, the number of breaklock flights occurring, the total number of run attempts made, and the ratio of these two is printed out in the format shown below.

```
*BREAKLOCK**BREAKLOCK**BREAKLOCK**BREAKLOCK**BREAKLOCK**BREAKLOCK**BREAKLOCK**BREAKLOCK**BREAKLOCK**BREAKLOCK*
*BREAKLOCK*
*BREAKLOCK* THIS RUN SET HAD 17 BREAKLOCK FLIGHTS OUT OF 30 GIVING A PROPORTION OF .5667 *BREAKLOCK*
*BREAKLOCK*
*BREAKLOCK*
*BREAKLOCK*
*BREAKLOCK**BREAKLOCK**BREAKLOCK**BREAKLOCK**BREAKLOCK**BREAKLOCK**BREAKLOCK**BREAKLOCK**BREAKLOCK**BREAKLOCK*
```

4.3 Sample Run

An example of a Monte Carlo run set and a CEP circle utilizing the OCS model is given in the following pages. The example consists of four runs out of a 25 run set that went into the CEP calculation.

INPUT DATA

1	GUST 2,3	3-0	-0.00	-0.	-0.	-0.0000	-0-0.0000
1	STCL 2,3	4-0	-0.00	-0.	-0.	-0.0000	-0-0.0000
2	SR-WINDS	23-0	-0.00	-0.	-0.	-0.0000	-0-0.0000
2	G3-ME	24-0	-0.00	-0.	-0.	-0.0000	-0-0.0000
2	G5-ME	25-0	-0.00	-0.	-0.	-0.0000	-0-0.0000
2	A1-ME	2-0	-0.00	-0.	-0.	-0.0000	-0-0.0000
2	A3-ME	4-0	-0.00	-0.	-0.	-0.0000	-0-0.0000
2	A2-ME	3-0	-0.00	-0.	-0.	-0.0000	-0-0.0000
2	G1-ME	17-0	-0.00	-0.	-0.	-0.0000	-0-0.0000
2	G2-ME	14-0	-0.00	-0.	-0.	-0.0000	-0-0.0000
2	S3	37-0	-0.00	-0.	-0.	-0.0000	-0-0.0000
2	G1-ME (LO-FQ)	7-0	-0.00	-0.	-0.	-0.0000	-0-0.0000
2	G4-ME	10-0	-0.00	-0.	-0.	-0.0000	-0-0.0000
3	T	2100-0	-0.00	0.	.1000000E+01	-0.0000	-0-0.0000
3	TF	2.01-0	-0.00	.1500000E+02	-0.	-0.0000	-0-0.0000
3	PPP	2100-0	-0.00	.3250000E+01	-0.	-0.0000	-0-0.0000
3	REPPLT	2100-0	-0.00	.1000000E+01	-0.	-0.0000	-0-0.0000
3	PLESS	2107-0	-0.00	.4700000E+01	-0.	-0.0000	-0-0.0000
3	PLOTNO	2103-0	-0.00	0.	-0.	-0.0000	-0-0.0000
3	DDO	2113-0	-0.00	.6000000E+01	-0.	-0.0000	-0-0.0000
3	OPP	2113-0	-0.00	.1000000E+01	-0.	-0.0000	-0-0.0000
3	OPP	2115-0	-0.00	.4000000E+01	-0.	-0.0000	-0-0.0000
3	HMIN	2562-0	-0.00	.2500000E+02	-0.	-0.0000	-0-0.0000
3	DER(1)	2564-0	-0.00	.5000000E+02	-0.	-0.0000	-0-0.0000
3	HMAX	2563-0	-0.00	.5000000E+02	-0.	-0.0000	-0-0.0000
3	OPTN2	3502-0	-0.00	.2000000E+01	-0.	-0.0000	-0-0.0000
3	OPTN4	3504-0	-0.00	.1000000E+01	-0.	-0.0000	-0-0.0000
3	OPTN6	3506-0	-0.00	.1000000E+01	-0.	-0.0000	-0-0.0000
3	VHKE	100-0	-0.00	0.	-0.	-0.0000	-0-0.0000
3	VHKE	101-0	-0.00	0.	-0.	-0.0000	-0-0.0000
3	VHKE	102-0	-0.00	0.	-0.	-0.0000	-0-0.0000
3	VHACH	200-0	-0.00	.1000000E+00	.1000000E+01	-0.0000	-0-0.0000
3	PHZRO	200-0	-0.00	0.	-0.	-0.0000	-0-0.0000
3	BALPHA	167-0	-0.00	0.	.1000000E+01	-0.0000	-0-0.0000
3	BALPHY	168-0	-0.00	0.	.1000000E+01	-0.0000	-0-0.0000
3	BTHG	127-0	-0.00	0.	.1000000E+01	-0.0000	-0-0.0000
3	SPDIS	131-0	-0.00	0.	.1000000E+01	-0.0000	-0-0.0000
3	HF	142-0	-0.00	.4000000E+03	-0.	-0.0000	-0-0.0000
3	HF	143-0	-0.00	0.	-0.	-0.0000	-0-0.0000
3	101	144-0	-0.00	0.	-0.	-0.0000	-0-0.0000
3	RLOCK	145-0	-0.00	.3281000E+05	-0.	-0.0000	-0-0.0000
3	JT	146-0	-0.00	.5000000E+01	-0.	-0.0000	-0-0.0000
3	JOB	147-0	-0.00	0.	-0.	-0.0000	-0-0.0000
3	CFUVZ	143-0	-0.00	.2000000E+02	-0.	-0.0000	-0-0.0000
3	CFQVY	143-0	-0.00	.2000000E+02	-0.	-0.0000	-0-0.0000
3	GGX	150-0	-0.00	.1000000E+02	-0.	-0.0000	-0-0.0000
3	SEPS	151-0	-0.00	0.	-0.	-0.0000	-0-0.0000
3	SNP	152-0	-0.00	0.	-0.	-0.0000	-0-0.0000
3	R8K	153-0	-0.00	0.	-0.	-0.0000	-0-0.0000
3	SEO	154-0	-0.00	.1000000E+02	-0.	-0.0000	-0-0.0000
3	OPTNSK	155-0	-0.00	0.	-0.	-0.0000	-0-0.0000
3	GS	156-0	-0.00	.5000000E+01	-0.	-0.0000	-0-0.0000
3	WSL	157-0	-0.00	.5000000E+01	-0.	-0.0000	-0-0.0000
3	ASH	158-0	-0.00	.1000000E+03	-0.	-0.0000	-0-0.0000
3	ASH	158-0	-0.00	.5000000E+02	-0.	-0.0000	-0-0.0000
3	HL2	159-0	-0.00	.3000000E+02	-0.	-0.0000	-0-0.0000
3	HL2	159-0	-0.00	.1500000E+02	-0.	-0.0000	-0-0.0000
3	TDY	160-0	-0.00	0.	-0.	-0.0000	-0-0.0000
3	SRAS	161-0	-0.00	.1000000E+01	-0.	-0.0000	-0-0.0000
3	SH	162-0	-0.00	.4000000E+01	-0.	-0.0000	-0-0.0000
3	SH	162-0	-0.00	.4000000E+01	-0.	-0.0000	-0-0.0000

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J AN1	161-0	-0.00	.1500000E+02	-0.	-0.0000	-0-0.0000
J AL	165-0	-0.00	.1500000E+01	-0.	-0.0000	-0-0.0000
J ALXX1	165-0	-0.00	.3500000E+02	-0.	-0.0000	-0-0.0000
J ALXX2	167-0	-0.00	.3500000E+02	-0.	-0.0000	-0-0.0000
J ALJK1	169-0	-0.00	.3500000E+02	-0.	-0.0000	-0-0.0000
J ALJK2	169-0	-0.00	.3500000E+02	-0.	-0.0000	-0-0.0000
J AJK	170-0	-0.00	.1500000E+02	-0.	-0.0000	-0-0.0000
J AXX	171-0	-0.00	.1750000E+03	-0.	-0.0000	-0-0.0000
J JXX	172-0	-0.00	.6500000E+00	-0.	-0.0000	-0-0.0000
J AJK	173-0	-0.00	.1750000E+03	-0.	-0.0000	-0-0.0000
J DJK	174-0	-0.00	.6500000E+00	-0.	-0.0000	-0-0.0000
J JXX	175-0	-0.00	.3500000E+00	-0.	-0.0000	-0-0.0000
J GJK	175-0	-0.00	.2500000E+01	-0.	-0.0000	-0-0.0000
J RES	177-0	-0.00	0.	-0.	-0.0000	-0-0.0000
J JBIAS	179-0	-0.00	0.	-0.	-0.0000	-0-0.0000
J ROIAS	179-0	-0.00	0.	-0.	-0.0000	-0-0.0000
J HXX	190-0	-0.00	.1800000E+02	-0.	-0.0000	-0-0.0000
J OPTACT	1140-0	-0.00	0.	-0.	-0.0000	-0-0.0000
J CR	1145-0	-0.00	.1300000E+02	-0.	-0.0000	-0-0.0000
J DCEL	1147-0	-0.00	.2400000E+03	-0.	-0.0000	-0-0.0000
J W1	1148-0	-0.00	.6000000E+01	-0.	-0.0000	-0-0.0000
J ZN	1149-0	-0.00	.1000000E+01	-0.	-0.0000	-0-0.0000
J S1	1151-0	-0.00	.7000000E+03	-0.	-0.0000	-0-0.0000
J BH	1152-0	-0.00	0.	-0.	-0.0000	-0-0.0000
J WN	1153-0	-0.00	.1600000E+03	-0.	-0.0000	-0-0.0000
J G2	1154-0	-0.00	.1000000E+01	-0.	-0.0000	-0-0.0000
J 3OP	1231-0	-0.00	0.	-0.	-0.0000	-0-0.0000
J 3OQ	1232-0	-0.00	0.	-0.	-0.0000	-0-0.0000
J 3OR	1233-0	-0.00	0.	-0.	-0.0000	-0-0.0000
J RFAREA	1303-0	-0.00	.1963000E+00	-0.	-0.0000	-0-0.0000
J RFLGT4	1317-0	-0.00	.5000000E+00	-0.	-0.0000	-0-0.0000
J RLUG	1315-0	-0.00	.2320000E+01	-0.	-0.0000	-0-0.0000
J RAIL	1317-0	-0.00	.3500000E+01	-0.	-0.0000	-0-0.0000
J AGV	1330-0	-0.00	0.	-0.	-0.0000	-0-0.0000
J 2NALGN	1403-0	-0.00	0.	-0.	-0.0000	-0-0.0000
J JBURN	1405-0	-0.00	0.	-0.	-0.0000	-0-0.0000
J CISP	1414-0	-0.00	.1965000E+03	-0.	-0.0000	-0-0.0000
J DMT	1415-0	-0.00	.5760000E+02	-0.	-0.0000	-0-0.0000
J DWP	1416-0	-0.00	.1500000E+02	-0.	-0.0000	-0-0.0000
J RDCGO	1417-0	-0.00	.7500000E+01	-0.	-0.0000	-0-0.0000
J RDCGF	1419-0	-0.00	.2670000E+00	-0.	-0.0000	-0-0.0000
J FMIKF	1419-0	-0.00	.5700000E+01	-0.	-0.0000	-0-0.0000
J FMIYF	1420-0	-0.00	.4600000E+01	-0.	-0.0000	-0-0.0000
J RLGO	1421-0	-0.00	.1430000E+01	-0.	-0.0000	-0-0.0000
J AGRAV	1627-0	-0.00	.3217400E+02	-0.	-0.0000	-0-0.0000
J KE	1515-0	-0.00	.6560000E+04	-0.	-0.0000	-0-0.0000
J ZE	1523-0	-0.00	.1000000E+03	-0.	-0.0000	-0-0.0000
J OPTARG	1539-0	-0.00	0.	-0.	-0.0000	-0-0.0000
J P	1733-0	-0.00	0.	-0.	-0.0000	-0-0.0000
J Q	1743-0	-0.00	0.	-0.	-0.0000	-0-0.0000
J R	1747-0	-0.00	0.	-0.	-0.0000	-0-0.0000
J BTHTO	1753-0	-0.00	0.	-0.	-0.0000	-0-0.0000
J BPSIO	1754-0	-0.00	0.	-0.	-0.0000	-0-0.0000
J STEP	2110-0	-0.00	.2000000E+01	-0.	-0.0000	-0-0.0000
J ST	2110-0	-0.00	0.	-0.	-0.0000	-0-0.0000
J PPP	2105-0	-0.00	.1000000E+01	-0.	-0.0000	-0-0.0000
J PPNT	2104-0	-0.00	0.	-0.	-0.0000	-0-0.0000
J	2664-0	-0.00	.1250000E+01	-0.	-0.0000	-0-0.0000
J TF	2101-0	-0.00	.2500000E+02	-0.	-0.0000	-0-0.0000
J MSL	157-0	-0.00	.3000000E+01	-0.	-0.0000	-0-0.0000
J MSL	157-0	-0.00	.1000000E+02	-0.	-0.0000	-0-0.0000
J KE	1515-0	-0.00	.6560000E+04	-0.	-0.0000	-0-0.0000
J AL	1515-0	-0.00	.3200000E+04	-0.	-0.0000	-0-0.0000
J K01	145-0	-0.00	.1430000E+02	-0.	-0.0000	-0-0.0000
J KR1	146-0	-0.00	.1430000E+02	-0.	-0.0000	-0-0.0000

J	KR2	149-0	-0.00	.5133000E+01	-0.	-0.0000	-0-0.0000
J	KQ3	149-0	-0.00	.3330000E+01	-0.	-0.0000	-0-0.0000
J	KR3	151-0	-0.00	.3330000E+01	-0.	-0.0000	-0-0.0000
J	KQ5	151-0	-0.00	.9980000E+03	-0.	-0.0000	-0-0.0000
J	KR5	152-0	-0.00	.9240000E+03	-0.	-0.0000	-0-0.0000
J	KQ6	153-0	-0.00	.3020000E+00	-0.	-0.0000	-0-0.0000
J	KP4	154-0	-0.00	.3020000E+00	-0.	-0.0000	-0-0.0000
J	KQ7	155-0	-0.00	.8700000E+01	-0.	-0.0000	-0-0.0000
J	KR7	155-0	-0.00	.8700000E+01	-0.	-0.0000	-0-0.0000
J	KQ8	157-0	-0.00	.4900000E+01	-0.	-0.0000	-0-0.0000
J	KR8	158-0	-0.00	.4400000E+01	-0.	-0.0000	-0-0.0000
J	KQ10	159-0	-0.00	.2680000E+01	-0.	-0.0000	-0-0.0000
J	KR10	160-0	-0.00	.2680000E+01	-0.	-0.0000	-0-0.0000
J	KQ11	161-0	-0.00	.9300000E+01	-0.	-0.0000	-0-0.0000
J	KR11	162-0	-0.00	.9300000E+01	-0.	-0.0000	-0-0.0000
J	KQ12	163-0	-0.00	.1000000E+01	-0.	-0.0000	-0-0.0000
J	KR12	164-0	-0.00	.1000000E+01	-0.	-0.0000	-0-0.0000
J	WTQ1	173-0	-0.00	.6170000E+01	-0.	-0.0000	-0-0.0000
J	WTQ1	174-0	-0.00	.6170000E+01	-0.	-0.0000	-0-0.0000
J	WTQ2	175-0	-0.00	.1890000E+01	-0.	-0.0000	-0-0.0000
J	WTQ2	175-0	-0.00	.1890000E+01	-0.	-0.0000	-0-0.0000
J	WGR1	177-0	-0.00	.5000000E+02	-0.	-0.0000	-0-0.0000
J	WGR1	177-0	-0.00	.5000000E+02	-0.	-0.0000	-0-0.0000
J	WGR3	181-0	-0.00	.2000000E+02	-0.	-0.0000	-0-0.0000
J	WGR3	182-0	-0.00	.2000000E+02	-0.	-0.0000	-0-0.0000
J	WGR4	183-0	-0.00	.1000000E+01	-0.	-0.0000	-0-0.0000
J	WGR4	184-0	-0.00	.1000000E+01	-0.	-0.0000	-0-0.0000
J	WGR5	185-0	-0.00	.3140000E+03	-0.	-0.0000	-0-0.0000
J	WGR5	185-0	-0.00	.3140000E+03	-0.	-0.0000	-0-0.0000
J	WGR6	187-0	-0.00	.1000000E+04	-0.	-0.0000	-0-0.0000
J	WGR6	188-0	-0.00	.1000000E+04	-0.	-0.0000	-0-0.0000
J	WGR2	191-0	-0.00	.3140000E+03	-0.	-0.0000	-0-0.0000
J	WGR2	192-0	-0.00	.3140000E+03	-0.	-0.0000	-0-0.0000
J	WGR4	193-0	-0.00	.1000000E+04	-0.	-0.0000	-0-0.0000
J	WGR4	193-0	-0.00	.1000000E+04	-0.	-0.0000	-0-0.0000
J	TCLQ	197-0	-0.00	.1500000E+01	-0.	-0.0000	-0-0.0000
J	TCLQ	197-0	-0.00	.1500000E+01	-0.	-0.0000	-0-0.0000
J	TCLR	199-0	-0.00	.3100000E+01	-0.	-0.0000	-0-0.0000
J	TCLR	199-0	-0.00	.3100000E+01	-0.	-0.0000	-0-0.0000
J	JI	165-0	-0.00	.3500000E+00	-0.	-0.0000	-0-0.0000
J	JO	165-0	-0.00	.6580000E+00	-0.	-0.0000	-0-0.0000
J	GEOS	197-0	-0.00	.1500000E+01	-0.	-0.0000	-0-0.0000
J	FRI	167-0	-0.00	.7000000E+00	-0.	-0.0000	-0-0.0000
J	FRO	169-0	-0.00	.1500000E+01	-0.	-0.0000	-0-0.0000
J	FFOV (OCS)	160-0	-0.00	.7000000E+00	-0.	-0.0000	-0-0.0000
J	TAKHT	101-0	-0.00	.1500000E+02	-0.	-0.0000	-0-0.0000
J	TARNO	102-0	-0.00	.1050000E+02	-0.	-0.0000	-0-0.0000
J	DER1	2164-0	-0.00	.8350000E-02	.1000000E+11	-0.0000	-0-0.0000
J	TAU	100-0	-0.00	.1670000E-01	-0.	-0.0000	-0-0.0000
J	RNSTR	1511-0	-0.00	.7700000E+02	-0.	-0.0000	-0-0.0000
J	GYRO DRIFT P1	1764-0	-0.00	.1525000E+00	.3000000E+11	-0.0000	-0-0.0000
J	GYRO DRIFT Q1	1765-0	-0.00	.5350000E-11	.3000000E+11	-0.0000	-0-0.0000
J	GYRO DRIFT P2	1766-0	-0.00	.1525000E+00	.3000000E+11	-0.0000	-0-0.0000
J	GYRO DRIFT R2	1767-0	-0.00	.5350000E-11	.3000000E+11	-0.0000	-0-0.0000
J	SPSIW	51-0	-0.00	.1000000E+11	-0.0000	-0-0.0000	-0-0.0000
J	VWTE	52-0	-0.00	.1000000E+11	-0.0000	-0-0.0000	-0-0.0000
J	STEADY WND VWTE	52-0	-0.00	.2800000E+02	.3000000E+11	-0.0000	-0-0.0000
J	STEADY WND SPISW	51 1	-0.00	.1000000E+01	.3000000E+11	-0.0000	-0-0.0000
J	FIN ELECQ	1247 1	-0.00	.5700000E+00	.1000000E+11	-0.0000	-0-0.0000
J	FIN ELECQ	1248 1	-0.00	.5700000E+00	.1000000E+11	-0.0000	-0-0.0000
J	FIN ELECRB	1249 1	-0.00	.5700000E+00	.1000000E+11	-0.0000	-0-0.0000
J	FIN MECHB	1250 1	-0.00	.3800000E+00	.1000000E+11	-0.0000	-0-0.0000
J	FIN MECHQB	1251 1	-0.00	.3800000E+00	.1000000E+11	-0.0000	-0-0.0000
J	FIN MECHRU	1252 1	-0.00	.3800000E+00	.1000000E+11	-0.0000	-0-0.0000
J	QNALGH	1003-0	-0.00	.1000000E+01	-0.	-0.0000	-0-0.0000
J	THRST X-OFFSET	1113 1	-0.00	.4200000E-02	.1000000E+11	-0.0000	-0-0.0000

8 THRST Z-OFFSET	1115	1	-0.00	.4200000E+02	-.1000000E+01	1.0000	-0-0.0000
8 THRST BALPHI	1101	1	-0.00	.2500000E+00	-.1000000E+01	1.0000	-0-0.0000
8 THRST BPHIT	1102	1	-0.00	.2500000E+00	-.1000000E+01	1.0000	-0-0.0000
8 AUTOPILOT GYRO	161	1	-0.00	.3000000E+01	-.1000000E+01	1.0000	-0-0.0000
8 AUTOPILOT GYRO	161	1	-0.00	.3000000E+01	-.1000000E+01	1.0000	-0-0.0000
8 AUTOPILOT GYRO	162	1	-0.00	.3000000E+01	-.1000000E+01	1.0000	-0-0.0000
8 EULER ANG BPSIC	1754	1	-0.00	.1000000E+01	-.3000000E+01	3.0000	-0-0.0000
8 EULER ANG BTHIO	1753	1	-0.00	.1000000E+01	-.3000000E+01	3.0000	-0-0.0000
8 EULER ANG BPHIO	1752	1	-0.00	.1000000E+01	-.3000000E+01	3.0000	-0-0.0000
8 OUTER UNBAL	111	-0	-0.00	.1500000E+01	-.3000000E+01	3.0000	-0-0.0000
8 INNER UNBAL	112	-0	-0.00	.1600000E+01	-.3000000E+01	3.0000	-0-0.0000
3 TIPOFF HP MEAN	1735	-0	-0.00	.2000000E+02	.1000000E+01	-0.0000	-0-0.0000
3 ZE	1323	-0	-0.00	-.6000000E+03	.1000000E+01	-0.0000	-0-0.0000
3 VMWTE	1374	-0	-0.00	.1300000E+03	.1000000E+01	-0.0000	-0-0.0000
3 FLAG	103	-0	-0.00	.1000000E+01	-0.	-0.0000	-0-0.0000
3 FLAG	606	-0	-0.00	0.	-0.	-0.0000	-0-0.0000
8 TIP OFF ROLL RATE	1733	-0	-0.00	.2000000E+02	-.3000000E+01	3.0000	-0-0.0000
8 FNY AMPL(LAUNCH)	1745	-0	-0.00	.1000000E+01	-.3000000E+01	3.0000	-0-0.0000
8 FNY AMPL(LAUNCH)	1742	-0	-0.00	.1000000E+01	-.3000000E+01	3.0000	-0-0.0000
3 FNY MEAN(LAUNCH)	1745	-0	-0.00	.0000000E+02	.1000000E+01	-0.0000	-0-0.0000
3 FNY MEAN(LAUNCH)	1742	-0	-0.00	.2000000E+03	.1000000E+01	-0.0000	-0-0.0000
3 KOAO	617	-0	-0.00	.0700000E+03	.1000000E+01	-0.0000	-0-0.0000
3 KOAI	613	-0	-0.00	.0700000E+03	.1000000E+01	-0.0000	-0-0.0000
8 KOAO	617	-0	-0.00	.3000000E+04	-.3000000E+01	3.0000	-0-0.0000
8 KOAI	613	-0	-0.00	.3000000E+04	-.3000000E+01	3.0000	-0-0.0000
3 KUI	612	-0	-0.00	.5000000E+01	.1000000E+01	-0.0000	-0-0.0000
3 KUO	611	-0	-0.00	.5000000E+01	.1000000E+01	-0.0000	-0-0.0000
3 KE	1315	-0	-0.00	-.1000000E+05	.1000000E+01	-0.0000	-0-0.0000
3 JTHIO	1753	-0	-0.00	-.2000000E+01	.1000000E+01	-0.0000	-0-0.0000
3 BTHIO	1753	-0	-0.00	-.0500000E+01	.1000000E+01	-0.0000	-0-0.0000
3 KE	1315	-0	-0.00	-.4000000E+04	.1000000E+01	-0.0000	-0-0.0000
3 BTHIO	1753	-0	-0.00	-.4000000E+01	.1000000E+01	-0.0000	-0-0.0000
3 KE	1315	-0	-0.00	-.7000000E+04	.1000000E+01	-0.0000	-0-0.0000
3 HELICOPTER VIB	625	-0	-0.00	.1000000E+01	-0.	-0.0000	-0-0.0000
6	-0-0	-0	-0.00	-0.	-0.	-0.0000	-0-0.0000

MONTE CARLO INITIAL CONDITIONS

C-INDEX	MC-VALUE	MEAN	DISTRIBUTION	LOWER BOUND	UPPER BOUND
52	8.1288072	0.0000000	NORMAL	-3.000	3.000
51	236.561	0.000	UNIFORM	0.000	350.000
1247	-.183	0.000	UNIFORM	-1.000	1.000
1248	.378	0.000	UNIFORM	-1.000	1.000
1249	-.329	0.000	UNIFORM	-1.000	1.000
1250	-.174	0.000	UNIFORM	-1.000	1.000
1251	-.377	0.000	UNIFORM	-1.000	1.000
1252	.281	0.000	UNIFORM	-1.000	1.000
1313	-.004	0.000	UNIFORM	-1.000	1.000
1314	-.004	0.000	UNIFORM	-1.000	1.000
1315	-.003	0.000	UNIFORM	-1.000	1.000
1401	.071	0.000	UNIFORM	-1.000	1.000
1402	-.230	0.000	UNIFORM	-1.000	1.000
1733	8.1197569	20.0000000	NORMAL	-3.000	3.000
1764	.0049006	0.0000000	NORMAL	-3.000	3.000
1765	-.0697272	0.0000000	NORMAL	-3.000	3.000
1766	.0005035	0.0000000	NORMAL	-3.000	3.000
1767	.0446268	0.0000000	NORMAL	-3.000	3.000
360	1.775	0.000	UNIFORM	-1.000	1.000
361	-.597	0.000	UNIFORM	-1.000	1.000
362	-.924	0.000	UNIFORM	-1.000	1.000
1754	.858	0.000	UNIFORM	-3.000	3.000
1753	-4.706	-4.900	UNIFORM	-3.000	3.000
1752	1.380	0.000	UNIFORM	-3.000	3.000
611	.0885407	.0500000	NORMAL	-3.000	3.000
612	.0379133	.0500000	NORMAL	-3.000	3.000
617	.0008617	.0000000	NORMAL	-3.000	3.000

TIME= .002:000 STEP SIZE= 2.000000E-03

FRONT LUG CLEARS RAIL T = 8.60E-02 REL VEL = 2.11E+02 PITCH MOMENT = -5.45E+01
RANGE = 3.5848

TIP OFF RATES--ROLL = 0.1 PITCH = -4.3 YAW = -3.1

REAR LUG CLEARS RAIL T = .1120 REL VEL = 232.329 RAIL FORCE = -40.63
RANGE = 5.9739
TIME= .112:000 STEP SIZE= 8.350000E-03

SURVOUT TIME= 3.0011 SEC.

OCS BLIND RANGE SIGNAL HOLD AT TIME = 6.21 RANGE = 329.79

***MAX BREAKLOCK VALUE = .28337 IN PITCH

***MAX BREAKLOCK VALUE = .27224 IN YAW

RUN NUMBER = 1

MISS DISTANCE = 4.7514125E+00

FLIGHT TIME = 6.5360395E+00

ROELX = -6.7331478E-01

ROELY = 4.5156575E-01

ROELZ = 4.6795396E+00

RYFP = -4.5454347E-01

RZFP = 4.7296209E+00

BZ *****
BY *****

INPUT DATA

6

-0-0 -0.00 -0. -0. -0.0000 -0-0.0000
MONTE CARLO INITIAL CONDITIONS

G-INDEX	MC-VALUE	MEAN	DISTRIBUTION	LOWER BOUND	UPPER BOUND
52	2.9129063	0.0000000	NORMAL	-3.000	3.000
51	163.976	0.000	UNIFORM	0.000	350.000
1247	-.074	0.000	UNIFORM	-1.000	1.000
1248	-.020	0.000	UNIFORM	-1.000	1.000
1249	-.403	0.000	UNIFORM	-1.000	1.000
1250	-.315	0.000	UNIFORM	-1.000	1.000
1251	-.180	0.000	UNIFORM	-1.000	1.000
1252	-.223	0.000	UNIFORM	-1.000	1.000
1313	-.003	0.000	UNIFORM	-1.000	1.000
1314	-.001	0.000	UNIFORM	-1.000	1.000
1315	-.002	0.000	UNIFORM	-1.000	1.000
1401	-.152	0.000	UNIFORM	-1.000	1.000
1402	.004	0.000	UNIFORM	-1.000	1.000
1733	38.2631223	20.0000000	NORMAL	-3.000	3.000
1764	.0383014	0.0000000	NORMAL	-3.000	3.000
1765	.0738540	0.0000000	NORMAL	-3.000	3.000
1766	-.0695206	0.0000000	NORMAL	-3.000	3.000
1767	-.1013949	0.0000000	NORMAL	-3.000	3.000
360	-2.686	0.000	UNIFORM	-1.000	1.000
361	1.096	0.000	UNIFORM	-1.000	1.000
362	.713	0.000	UNIFORM	-1.000	1.000
1754	.389	0.000	UNIFORM	-3.000	3.000
1753	-3.681	-4.900	UNIFORM	-3.000	3.000
1752	1.190	0.000	UNIFORM	-3.000	3.000
611	.0418523	.0500000	NORMAL	-3.000	3.000
612	.0615168	.0500000	NORMAL	-3.000	3.000
617	.0003060	.0003700	NORMAL	-3.000	3.000
618	.0008466	.0008700	NORMAL	-3.000	3.000

TIME= .002000 STEP SIZE= 2.000000E-03

FRONT LUG CLEARS RAIL T = 8.60E-02 REL VEL = 2.11E+02 PITCH MOMENT = -5.43E+01
RANGE = 3.5829
TIPOFF RATES--ROLL = 38.3 PITCH = -21.5 YAW = -1.9

REAR LUG CLEARS RAIL T = .1120 REL VEL = 232.875 RAIL FORCE = -41.32
RANGE = 5.9769
TIME= .112.000 STEP SIZE= 8.350000E-03

BURNOUT TIME= 3.0011 SEC.

OCS BLIND RANGE SIGNAL HOLD AT TIME = 6.24 RANGE = 305.73

***MAX BREAKLOCK VALUE = .38339 IN PITCH
***MAX BREAKLOCK VALUE = -.34518 IN YAW

RUN NUMBER = 2

MISS DISTANCE = 3.827765E+00

FLIGHT TIME = 6.5467267E+00

RDELX = -5.7209481E-01 RDELY = 5.4297058E-11 RDELZ = 3.7595870E+00

RVFP = 5.3249114E-01

RZFP = 3.0057098E+00

INPUT DATA

6 -0-0 -0.00 -0. -0. -0.0000 -0-0.0000
 MONTE CARLO INITIAL CONDITIONS

C-INDEX	MC-VALUE	MEAN	DISTRIBUTION	LOWER BOUND	UPPER BOUND
52	50.1629962	0.0000000	NORMAL	-3.000	3.000
51	248.545	0.000	UNIFORM	0.000	350.000
1247	.193	0.000	UNIFORM	-1.000	1.000
1248	.066	0.000	UNIFORM	-1.000	1.000
1249	-.118	0.000	UNIFORM	-1.000	1.000
1250	-.261	0.000	UNIFORM	-1.000	1.000
1251	-.089	0.000	UNIFORM	-1.000	1.000
1252	.163	0.000	UNIFORM	-1.000	1.000
1313	.003	0.000	UNIFORM	-1.000	1.000
1314	.003	0.000	UNIFORM	-1.000	1.000
1315	.003	0.000	UNIFORM	-1.000	1.000
1401	.105	0.000	UNIFORM	-1.000	1.000
1402	-.156	0.000	UNIFORM	-1.000	1.000
1733	43.3419734	20.0000000	NORMAL	-3.000	3.000
1764	.0046708	0.0000000	NORMAL	-3.000	3.000
1765	-.00206029	0.0000000	NORMAL	-3.000	3.000
1766	-.00677724	0.0000000	NORMAL	-3.000	3.000
1767	.00243741	0.0000000	NORMAL	-3.000	3.000
360	.538	0.000	UNIFORM	-1.000	1.000
361	2.257	0.000	UNIFORM	-1.000	1.000
362	.675	0.000	UNIFORM	-1.000	1.000
1754	.855	0.000	UNIFORM	-3.000	3.000
1753	-3.641	-4.900	UNIFORM	-3.000	3.000
1752	-2.797	0.000	UNIFORM	-3.000	3.000
611	.0685639	.0500000	NORMAL	-3.000	3.000
612	.0585906	.0500000	NORMAL	-3.000	3.000
617	.0008758	.0008700	NORMAL	-3.000	3.000
618	.0008565	.0008700	NORMAL	-3.000	3.000

TIME = .0021000 STEP SIZE = 2.000000E-03

FRONT LUG CLEARS RAIL T = 8.60E-02 REL VEL = 2.11E+02 PITCH MOMENT = -6.41E+01
 RANGE = 3.5828

TIPOFF RATES--ROLL = 43.4 PITCH = -22.0 YAW = 4.2

REAR LUG CLEARS RAIL T = .1120 REL VEL = 232.375 RAIL FORCE = -49.56
 RANGE = 5.9768
 TIME = .1120000 STEP SIZE = 8.350000E-03

BURNOUT TIME = 3.0011 SEC.

 OCS BLIND RANGE SIGNAL HOLD AT TIME = 6.16 RANGE = 305.94

***MAX BREAKLOCK VALUE = .36498 IN PITCH

***MAX BREAKLOCK VALUE = .22631 IN YAW

RUN NUMBER = 3

MISS DISTANCE = 3.9796680E+00

FLIGHT TIME = 6.4384555E+00

RDELX = -6.5284602E-01

RDELY = 5.2700033E-01

RDELZ = 3.8901170E+00

RYFP = 4.9703574E-11

RZFP = 3.9487081E+00

INPT DATA

6

-1-0 -0.00 -0. -0. -0.0010 -0-0.0000
MONTE CARLO INITIAL CONDITIONS

C-INDEX	MC-VALUE	MEAN	DISTRIBUTION	LOWER BOUND	UPPER BOUND
52	-30.7594857	0.0000000	NORMAL	-3.000	3.000
51	20.578	0.000	UNIFORM	0.000	360.000
1247	.352	0.000	UNIFORM	-1.000	1.000
1248	-.510	0.000	UNIFORM	-1.000	1.000
1249	-.195	0.000	UNIFORM	-1.000	1.000
1250	.223	0.000	UNIFORM	-1.000	1.000
1251	-.073	0.000	UNIFORM	-1.000	1.000
1252	-.150	0.000	UNIFORM	-1.000	1.000
1313	-.002	0.000	UNIFORM	-1.000	1.000
1314	.001	0.000	UNIFORM	-1.000	1.000
1315	.003	0.000	UNIFORM	-1.000	1.000
1401	-.120	0.000	UNIFORM	-1.000	1.000
1402	-.048	0.000	UNIFORM	-1.000	1.000
1738	42.4128024	20.0000000	NORMAL	-3.000	3.000
1764	.1296747	0.0000000	NORMAL	-3.000	3.000
1765	.0250585	0.0000000	NORMAL	-3.000	3.000
1766	-.0722943	0.0000000	NORMAL	-3.000	3.000
1767	-.0855807	0.0000000	NORMAL	-3.000	3.000
360	.311	0.000	UNIFORM	-1.000	1.000
361	-2.630	0.000	UNIFORM	-1.000	1.000
362	2.884	0.000	UNIFORM	-1.000	1.000
1754	.386	0.000	UNIFORM	-3.000	3.000
1753	-2.857	-4.900	UNIFORM	-3.000	3.000
1752	-2.346	0.000	UNIFORM	-3.000	3.000
611	.0693596	.0500000	NORMAL	-3.000	3.000
612	.0739063	.0500000	NORMAL	-3.000	3.000
617	.0003564	.0000000	NORMAL	-3.000	3.000
610	.0008411	.0000000	NORMAL	-3.000	3.000

TIME = .002000 STEP SIZE = 2.000000E-03

FRONT LUG CLEARS RAIL T = 8.60E-02 REL VEL = 2.11E+02 PITCH MOMENT = -5.02E+01
RANGE = 3.5812

TIPOFF RATES--ROLL = 42.3 PITCH = -16.8 YAW = 1.6

REAR LUG CLEARS RAIL T = .1120 REL VEL = 232.925 RAIL FORCE = -35.63
RANGE = 5.9740

TIME = .112000 STEP SIZE = 0.350000E-03

BURNOUT TIME = 3.0011 SEC.

OCS BLIND RANGE SIGNAL HOLD AT TIME = 6.44 RANGE = 318.98

***MAX BREAKLOCK VALUE = .35363 IN PITCH

***MAX BREAKLOCK VALUE = .27758 IN YAW

RUN NUMBER = 4

MISS DISTANCE = 4.4172301E+00

FLIGHT TIME = 6.775873E+00

RDELX = -5.1398689E-01

RDELY = -6.1444841E-11

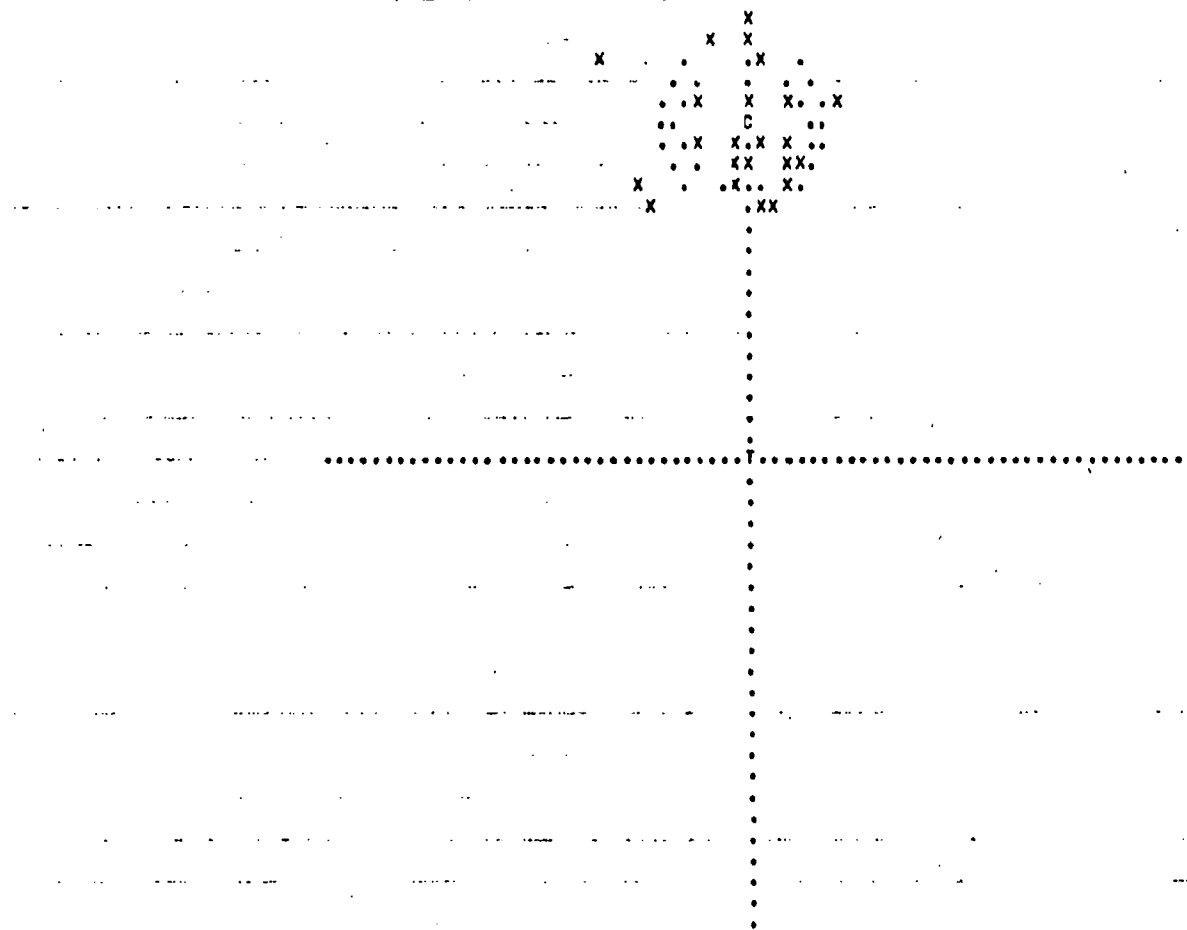
RDELZ = 4.3329670E+00

CEP CENTROID AT (-.069,4.449)

DISTANCE FROM TARGET CENTER= 4.451

CEP CONFIDENCE CIRCLE FOR LAMBDA = 0.00

POINTS X
CEP CIRCLE
CIRCLE CENTROID C
TGT CENTER T
99 PER CENT CONFIDENCE CIRCLE



CEP CENTROID= (-.069, 4.449) DIST. FROM TGT CENTER= 4.451 CEP= .857
THE 99 PER CENT CONFIDENCE CIRCLE RADIUS IS 1.118

5.0 COMMENTS

5.1 Integration Synchronization With Sample Period

Numerical integration must be synchronized with sample period* (τ @ ZOH) in order to insure accurate integration. Logic is built into the seeker subroutines to insure that integration and sample period are synchronized. This is accomplished by:

$$\Delta t = \tau / [\text{AINT}(\tau / \Delta t_{\text{INPUT}})]$$

where

- τ — sample period (SEC).
- Δt_{INPUT} — input integration stepsize (SEC).
- $\text{AINT}(X)$ — computer center library function that integerizes
 the argument (X).
- Δt — computer integration stepsize that the program will use.

The above function will always compute an integration stepsize that is equal to or greater than the input stepsize. Since there is an upper bound on the stepsize that can be used to integrate the differential equations in this simulation program, there is the possibility that a stepsize larger than the upper bound will be computed. (Upper bound is approximately 12.5 millisecc, with the exception of the OCS seeker model S2 which has an upper bound of approximately .5 millisecc). Therefore, one should insure that a reasonable stepsize is input and verify that a reasonable stepsize is computed. For example, if the sample period is 16.7 milliseccs, then a stepsize of 8.35 milliseccs or less must be input to insure that the computed stepsize is 12.5 milliseccs or less.

* A discussion of errors caused by numerical integration of sample data is given in Reference 5.

REFERENCES

1. "An Engineering and Programming Guide For a Six Degree of Freedom, Terminal Homing Simulation Program," TR RG-73-22, dated 10 October 1973.
2. "User's Guide For a Monte Carlo Point Target Terminal Homing Simulation Program," TR RG-74-37, dated 20 May 1974.
3. "Terminal Homing Engineering Flight Test T7 and MT7 Missile Launch Transients Data Reduction and Summary," TR RG-75-12, dated 29 August 1974.
4. "TSAP (Time Series Analysis Program): A Monte Carlo Support Module," Computer Sciences Corporation, dated 19 April 1974.
5. "Laser Guided Close Air Support Weapons Systems Effectiveness Measures," Computer Sciences Corporation, dated 28 September 1973.

APPENDIX

Monte Carlo 6-DOF Program Listing

A FORTRAN IV listing of the Monte Carlo 6-DOF Program that is operational on the MICOM CDC 6600 computer, SCOPE 3.4 operating system, is given in the following pages.

	PROGRAM MAIN(INPUT,OUTPUT,FILE,TAPE14,TAPE5=FILE,TAPE6=OUTPUT)	MSIX	2
C		MSIX	3
C	C*****DIMOS TO BE USED WITH FORTRAN ANDK INTEGRATION ROUTINE	MSIX	4
C		MSIX	5
5	COMMON C(3030),C(2APK	MSIX	6
	COMMON/CEPASS/X(100),Y(100)	MSIX	7
	EQUIVALENCE (C(256),HMIN), (C(266),IMAX), (C(266),JER),	MSIX	8
	(C(256),N), (C(256),IPL), (C(296),VAR),	MSIX	9
	(C(200),T), (C(201),STEP), (C(201),STEP),	MSIX	10
10	(C(201),LSTEP), (C(208),PLOTNO), (C(209),MOPLOT),	MSIX	11
	(C(203),OPOINT), (C(205),TIME), (C(232),VLABLE),	MSIX	12
	(C(167),MOOUT), (C(202),OPTM10), (C(206),REPLT),	MSIX	13
	(C(266),EU), (C(266),EL), (C(207),PTESS),	MSIX	14
	(C(197),RITE), (C(197),RKUTTA)	MSIX	15
15	EQUIVALENCE (C(197),KASE), (C(197),NJ), (C(197),MPT)	MSIX	16
	EQUIVALENCE (C(1512),ISGJ), (C(1721),ITCT), (C(1511),RNSIRT)	MSIX	17
	EQUIVALENCE (C(21),IBVNSH)	MSIX	18
	EQUIVALENCE (C(22),IPL0T)	MSIX	19
	EQUIVALENCE (C(23),KLAN30)	MSIX	20
20	EQUIVALENCE (C(24),KSSIS)	MSIX	21
	EQUIVALENCE (C(25),CEPSIG)	MSIX	22
	EQUIVALENCE (C(100),RMIS)	MSIX	23
	DIMENSION RAISS(100)	MSIX	24
	EQUIVALENCE (C(100),RMISST)	MSIX	25
25	EQUIVALENCE (C(101),L)	MSIX	26
	EQUIVALENCE (C(102),RPF)	MSIX	27
	EQUIVALENCE (C(119),PSIZE)	MSIX	28
	EQUIVALENCE (C(103),RZF)	MSIX	29
30	EQUIVALENCE (C(31),CEP)	MSIX	30
	EQUIVALENCE (C(1925),NGASE), (C(625), IBL)	MSIX	31
	EQUIVALENCE (C(623), DERSV)	LAG	1
	REAL KSSIG	MSIX	32
	INTEGER CEPSIG	MSIX	33
	DIMENSION CEPSIG(15)	MSIX	34
35	DIMENSION GAPH(1,1),TIME(300)	MSIX	35
	DIMENSION VASLE(2,15), IPL(100)	MSIX	36
	DIMENSION VAR(101), EL(100)	MSIX	37
	EQUIVALENCE (C(190),RM)	MSIX	38
	EQUIVALENCE (C(198),RNT)	MSIX	39
40	EQUIVALENCE (C(1362),PLOTN4)	MSIX	40
	EQUIVALENCE (C(1303),PLOTN2)	MSIX	41
	EQUIVALENCE (C(1384),NPL0T)	MSIX	42
	INTEGER OPOINT	MSIX	43
	INTEGER OPT	MSIX	44
45	EXTERNAL AUXSUB	MSIX	45
	ISGT=0	MSIX	46
	ITCI=0	MSIX	47
	NOBE=-1	MSIX	48
	ITSNOX=0	MSIX	49
50		MSIX	50
		MSIX	51
		MSIX	52
		MSIX	53
55		MSIX	54
		MSIX	55
		MSIX	56
		MSIX	57

THIS CALL TO SUBROUTINE RANUM IS TO PERMIT USE OF
DIFFERENT RANDOM NUMBER GENERATOR STARTERS (IRNST).
IF SUBROUTINE NORMAL IS CALLED AT140UT FIRST CALLING
RANUM, THE RANDOM NUMBER SEQUENCE WILL ALWAYS
BE STARTED WITH THE SAME NUMBER (ENTERED AS A DATA
STATEMENT IN SUBROUTINE NORMAL), WHICH WILL RESULT

```

C      L=1
      MP = 6
      CALL COMFV
      1000 CALL ZERO
      1001 IF (PLOTING.LG-0.1) GO TO 1
      IF (REPLT.ST-0.1) GO TO 1
C
C      REPLT = 0. JSE NEW NO. 7 (DISCARD OLD)
C      1. JSE OLD PLUS THOSE ADDED
C      -1. JSE NEW NO. 7 (DISCARD OLD)
      IF (REPLT.GT.-1.0) NOOUT = 0
      NPLOT = 0
      7 CALL OINP1
      CONTINUE
      CALL RANM4(1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100,101,102,103,104,105,106,107,108,109,110,111,112,113,114,115,116,117,118,119,120,121,122,123,124,125,126,127,128,129,130,131,132,133,134,135,136,137,138,139,140,141,142,143,144,145,146,147,148,149,150,151,152,153,154,155,156,157,158,159,160,161,162,163,164,165,166,167,168,169,170,171,172,173,174,175,176,177,178,179,180,181,182,183,184,185,186,187,188,189,190,191,192,193,194,195,196,197,198,199,200,201,202,203,204,205,206,207,208,209,210,211,212,213,214,215,216,217,218,219,220,221,222,223,224,225,226,227,228,229,230,231,232,233,234,235,236,237,238,239,240,241,242,243,244,245,246,247,248,249,250,251,252,253,254,255,256,257,258,259,260,261,262,263,264,265,266,267,268,269,270,271,272,273,274,275,276,277,278,279,280,281,282,283,284,285,286,287,288,289,290,291,292,293,294,295,296,297,298,299,300,301,302,303,304,305,306,307,308,309,310,311,312,313,314,315,316,317,318,319,320,321,322,323,324,325,326,327,328,329,330,331,332,333,334,335,336,337,338,339,340,341,342,343,344,345,346,347,348,349,350,351,352,353,354,355,356,357,358,359,360,361,362,363,364,365,366,367,368,369,370,371,372,373,374,375,376,377,378,379,380,381,382,383,384,385,386,387,388,389,390,391,392,393,394,395,396,397,398,399,400,401,402,403,404,405,406,407,408,409,410,411,412,413,414,415,416,417,418,419,420,421,422,423,424,425,426,427,428,429,430,431,432,433,434,435,436,437,438,439,440,441,442,443,444,445,446,447,448,449,450,451,452,453,454,455,456,457,458,459,460,461,462,463,464,465,466,467,468,469,470,471,472,473,474,475,476,477,478,479,480,481,482,483,484,485,486,487,488,489,490,491,492,493,494,495,496,497,498,499,500,501,502,503,504,505,506,507,508,509,510,511,512,513,514,515,516,517,518,519,520,521,522,523,524,525,526,527,528,529,530,531,532,533,534,535,536,537,538,539,540,541,542,543,544,545,546,547,548,549,550,551,552,553,554,555,556,557,558,559,560,561,562,563,564,565,566,567,568,569,570,571,572,573,574,575,576,577,578,579,580,581,582,583,584,585,586,587,588,589,590,591,592,593,594,595,596,597,598,599,600,601,602,603,604,605,606,607,608,609,610,611,612,613,614,615,616,617,618,619,620,621,622,623,624,625,626,627,628,629,630,631,632,633,634,635,636,637,638,639,640,641,642,643,644,645,646,647,648,649,650,651,652,653,654,655,656,657,658,659,660,661,662,663,664,665,666,667,668,669,670,671,672,673,674,675,676,677,678,679,680,681,682,683,684,685,686,687,688,689,690,691,692,693,694,695,696,697,698,699,700,701,702,703,704,705,706,707,708,709,710,711,712,713,714,715,716,717,718,719,720,721,722,723,724,725,726,727,728,729,730,731,732,733,734,735,736,737,738,739,740,741,742,743,744,745,746,747,748,749,750,751,752,753,754,755,756,757,758,759,760,761,762,763,764,765,766,767,768,769,770,771,772,773,774,775,776,777,778,779,780,781,782,783,784,785,786,787,788,789,790,791,792,793,794,795,796,797,798,799,800,801,802,803,804,805,806,807,808,809,810,811,812,813,814,815,816,817,818,819,820,821,822,823,824,825,826,827,828,829,830,831,832,833,834,835,836,837,838,839,840,841,842,843,844,845,846,847,848,849,850,851,852,853,854,855,856,857,858,859,860,861,862,863,864,865,866,867,868,869,870,871,872,873,874,875,876,877,878,879,880,881,882,883,884,885,886,887,888,889,890,891,892,893,894,895,896,897,898,899,900,901,902,903,904,905,906,907,908,909,910,911,912,913,914,915,916,917,918,919,920,921,922,923,924,925,926,927,928,929,930,931,932,933,934,935,936,937,938,939,940,941,942,943,944,945,946,947,948,949,950,951,952,953,954,955,956,957,958,959,960,961,962,963,964,965,966,967,968,969,970,971,972,973,974,975,976,977,978,979,980,981,982,983,984,985,986,987,988,989,990,991,992,993,994,995,996,997,998,999,1000,1001,1002,1003,1004,1005,1006,1007,1008,1009,1010,1011,1012,1013,1014,1015,1016,1017,1018,1019,1020,1021,1022,1023,1024,1025,1026,1027,1028,1029,1030,1031,1032,1033,1034,1035,1036,1037,1038,1039,1040,1041,1042,1043,1044,1045,1046,1047,1048,1049,1050,1051,1052,1053,1054,1055,1056,1057,1058,1059,1060,1061,1062,1063,1064,1065,1066,1067,1068,1069,1070,1071,1072,1073,1074,1075,1076,1077,1078,1079,1080,1081,1082,1083,1084,1085,1086,1087,1088,1089,1090,1091,1092,1093,1094,1095,1096,1097,1098,1099,1100,1101,1102,1103,1104,1105,1106,1107,1108,1109,1110,1111,1112,1113,1114,1115,1116,1117,1118,1119,1120,1121,1122,1123,1124,1125,1126,1127,1128,1129,1130,1131,1132,1133,1134,1135,1136,1137,1138,1139,1140,1141,1142,1143,1144,1145,1146,1147,1148,1149,1150,1151,1152,1153,1154,1155,1156,1157,1158,1159,1160,1161,1162,1163,1164,1165,1166,1167,1168,1169,1170,1171,1172,1173,1174,1175,1176,1177,1178,1179,1180,1181,1182,1183,1184,1185,1186,1187,1188,1189,1190,1191,1192,1193,1194,1195,1196,1197,1198,1199,1200,1201,1202,1203,1204,1205,1206,1207,1208,1209,1210,1211,1212,1213,1214,1215,1216,1217,1218,1219,1220,1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PROGRAM NAME	74/74	OPT=1	FTN 4.2+75067	05/15/75	15-15-20	PAGE
2-----						MCSIX 172
3-----						MCSIX 173
175 IF(J.GT.30) WRITE (6,800)						MCSIX 174
IF(J.GT.30) J=0						MCSIX 175
801 CONTINUE						MCSIX 176
IF(18L.E.0) GO 13-804						MCSIX 177
L=L-1						MCSIX 178
X18L=18L						MCSIX 179
XL=L						MCSIX 180
RATIO=X18L/XL						MCSIX 181
WRITE(6,806) 13L,L,RATIO						MCSIX 182
806 FORMAT(1H,15(1,1X,10(11H*3BREAKLOCK*)),						MCSIX 183
1X,11H*3BREAKLOCK*,50X,11H*3BREAKLOCK*,						MCSIX 184
1X,11H*3BREAKLOCK*,80X,11H*3BREAKLOCK*,						MCSIX 185
1X,11H*3BREAKLOCK*,3X,THIS RUN SET HAD 14,* BREAKLOCK FL MCSIX						186
1X,11H*3BREAKLOCK*,80X,11H*3BREAKLOCK*,						MCSIX 187
1X,11H*3BREAKLOCK*,80X,11H*3BREAKLOCK*,						MCSIX 188
1X,11H*3BREAKLOCK*,80X,11H*3BREAKLOCK*,						MCSIX 189
1X,10(11H*3BREAKLOCK*))						MCSIX 190
804 CONTINUE						MCSIX 191
CALL CEPAS(NP,IVNSH,IPLOT,XLAMBD,KSSIG,CEPSIG,PSIZE)						MCSIX 192
860 CONTINUE						MCSIX 193
CALL EXIT						MCSIX 194
STOP						MCSIX 195
END						MCSIX 195

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
10214 MAIN	1	
VARIABLES	SM TYPE	RELLOCATION
O C	REAL	ARRAY //
30 CEPISIG	INTEGER	ARRAY //
10752 DELT	REAL	REFS 19
5147 DER	REAL	REFS 20
1156 DERSV	REAL	REFS 28
10746 OOH	REAL	REFS 42
5314 EL	REAL	REFS 21
5460 EU	REAL	REFS 132
7366 GRAPH	REAL	REFS 7
5146 MHAX	REAL	REFS 31
5145 MMIN	REAL	REFS 73
10755 I	INTEGER	REFS 7
1160 IBL	INTEGER	REFS 30166
24 IBVNSH	INTEGER	REFS 30
10747 IDUH	INTEGER	REFS 17
5001 IPL	INTEGER	REFS 74
25 IPL	INTEGER	REFS 7
6667 ISGCT	INTEGER	REFS 18
7210 ITCT	INTEGER	REFS 16
10744 ITSNUX	INTEGER	REFS 16
10754 J	INTEGER	REFS 49
3664 KASE	INTEGER	REFS 165
27 KSSIG	REAL	REFS 15
3732 KSTEP	INTEGER	REFS 20
454 L	INTEGER	REFS 7
36 LCPEP	INTEGER	REFS 25
10753 LESSPT	INTEGER	REFS 182
3733 LSTEP	INTEGER	REFS 29
10743 MOOE	INTEGER	REFS 136
5000 N	INTEGER	REFS 7
7350 NCASE	INTEGER	REFS 30
3665 NJ	INTEGER	REFS 15
6136 NOOUT	INTEGER	REFS 7
3730 NOPLOI	INTEGER	REFS 7
10745 NP	INTEGER	REFS 80
3677 NPLQI	INTEGER	REFS 107
10751 NPLOT2	INTEGER	REFS 42
10750 NPLOT4	INTEGER	REFS 137
3664 NPT	INTEGER	REFS 15
3746 OPPOINT	INTEGER	REFS 7
10742 OPT	INTEGER	REFS 316
3745 OPTINIO	REAL	REFS 7
3727 PLOTNO	REAL	REFS 7
3676 PLOTN2	REAL	REFS 41

FILE NAMES	MODE
4102 FILE	
0 INPUT	
2041 OUTPUT	
6143 TAPE14	
4102 TAPES	
2041 TAPE6	
WRITES	113 115 119 133 141 155 166
	174 182 173 177

EXTERNALS	TYPE	ARGS	REFERENCES
AMRK	1		90
AUX1	6		82
AUXSUB	0		45
CEPAS	7		192
COUNTV	0		61
DUMPO	0		123
EX11	6		196
MCARLO	3		74
QINP11	0		71
PLOTN	7		133
PLOT2	7		133
PLOT4	7		137
PROCES	6		128
RANUM	3		73
RESET	0		130
SUBL1	6		81
SUBL2	0		83
SUBL3	0		92
SA	6		127
TIMEV	1		132
ZERO	0		62

STATEMENT LABELS		DEF LINE REFERENCES	
10347 5		143	131
10231 7		71	63
10234 8		72	153
10303 20		112	105
10311 21		120	111
10512 22	FMT	113	115
10537 96	FMT	134	133
10547 97	FMT	142	141
10571 800	FMT	160	153
10601		176	164
10622 802	FMT	167	165
10646 803	FMT	171	171
10437 804		191	177
10564 805	FMT	114	113
10676 806	FMT	183	182
10557 807	FMT	137	155
10223 1000		62	143
10224 1001		63	143
10253 1002		81	143
10254 1003		82	143
10255 1004		83	143
10256 1005		84	143
10264 1006		88	143
10265 1007		89	93
10270 1008		91	143
10270 1009		92	143
10366 1010		145	143
0 4668	INACTIVE	193	

COMMON BLOCKS		MEMBERS - BIAS NAME(LENGTH)	
CEPASS	20C	0 X	(100)
3031		3031 GRAP4	(1)
100 Y		100 Y	(100)

EQUIV CLASSES		MEMBERS - BIAS NAME(LENGTH)	
C	3031	10.PSIZE	(1)
		22 XLA4B	(1)
		30 LCEP	(1)
		301 MYF	(1)
		524 IBL	(1)
		1971 KNOTTA	(1)
		1374 MPT	(1)
		1301 PLOTN	(1)
		1999.F	(1)
		2310 KSTEP	(1)
		2322 OPOINT	(1)
		2560 N	(1)
		2662 MAX	(1)
		2864 LU	(100)
		3510 KNSTRT	(1)
		3824 NCASE	(1)
		20 IBVNSM	(1)
		23 KSSIG	(1)
		239 RMSS	(1)
		302 RZF	(1)
		999 RMISST	(100)
		1972 KASE	(1)
		1973 RN	(1)
		1982 PLOTN2	(1)
		2005 REPPLT	(1)
		2008 NOPLOT	(1)
		2011 LSTEP	(1)
		2024 TIME	(303)
		2561 IPL	(100)
		2663 DER	(101)
		2964 VAR	(101)
		3511 ISJCT	(1)
		21 IPLOT	(1)
		24 CEP SIG	(6)
		300 L	(1)
		622 DER SV	(1)
		1970 RITE	(1)
		1973 NJ	(1)
		1980 RNT	(1)
		1983 NPL0T	(1)
		2006 PLESS	(1)
		2009 STEP	(1)
		2021 OPTN10	(1)
		2324 VLABLE	(30)
		2661 HMIN	(1)
		2764 EL	(106)
		3166 NOOUT	(1)
		3720 ITCT	(1)

PROGRAM MAIN	74/74	OPT=1	FTN 4.2+75067	05/05/75	16-16-20.	PAGE 6
STATISTICS						
PROGRAM LENGTH		553		365		
BUFFER LENGTH		102043		4226		
CM LABELED COMMON LENGTH		3103		200		
CM BLANK COMMON LENGTH		73673		3031		

60	DATA CN6/	MCSIX 254
		MCSIX 255
		MCSIX 256
		MCSIX 257
		MCSIX 258
		MCSIX 259
		MCSIX 260
		MCSIX 261
		MCSIX 262
		MCSIX 263
		MCSIX 264
		MCSIX 265
		MCSIX 266
		MCSIX 267
		MCSIX 268
		MCSIX 269
		MCSIX 270
		MCSIX 271
		MCSIX 272
		MCSIX 273
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		MCSIX 282
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		MCSIX 289
		MCSIX 290
		MCSIX 291
		MCSIX 292
		MCSIX 293
		MCSIX 294
		MCSIX 295
		MCSIX 296
		MCSIX 297
		MCSIX 298
		MCSIX 299

SYMBOLIC REFERENCE MAP (R-3)

VARIABLES	SN	TYPE	RELOCATION	REFS	2	DEFINED	21
0 BAZ	REAL	ARRAY	CA2	REFS	2	DEFINED	22
0 BAZ	REAL	ARRAY	CA3	REFS	2	DEFINED	23
0 BAS	REAL	ARRAY	CA5	REFS	6	DEFINED	31
0 CLD1	REAL	ARRAY	CLDF	REFS	6	DEFINED	36
0 CLP	REAL	ARRAY	CLPF	REFS	6	DEFINED	73
0 CL2	REAL	ARRAY	CL2F	REFS	6	DEFINED	69
0 GL4	REAL	ARRAY	GL4F	REFS	6	DEFINED	45
0 GMD1	REAL	ARRAY	GMD1F	REFS	6	DEFINED	25
0 GMD1	REAL	ARRAY	GMD1F	REFS	6	DEFINED	33
0 GMD1	REAL	ARRAY	GMD1F	REFS	6	DEFINED	89
0 GMD1	REAL	ARRAY	GMD1F	REFS	6	DEFINED	83
0 GMD1	REAL	ARRAY	GMD1F	REFS	6	DEFINED	52
0 GMD1	REAL	ARRAY	GMD1F	REFS	6	DEFINED	24
0 GMD1	REAL	ARRAY	GMD1F	REFS	6	DEFINED	55
0 GMD1	REAL	ARRAY	GMD1F	REFS	6	DEFINED	39
0 GMD1	REAL	ARRAY	GMD1F	REFS	6	DEFINED	27
0 GMD1	REAL	ARRAY	GMD1F	REFS	6	DEFINED	77
0 GMD1	REAL	ARRAY	GMD1F	REFS	6	DEFINED	12
0 GMD1	REAL	ARRAY	GMD1F	REFS	6	DEFINED	13
0 GMD1	REAL	ARRAY	GMD1F	REFS	6	DEFINED	14
0 GMD1	REAL	ARRAY	GMD1F	REFS	6	DEFINED	15
0 GMD1	REAL	ARRAY	GMD1F	REFS	6	DEFINED	16
0 GMD1	REAL	ARRAY	GMD1F	REFS	6	DEFINED	17
0 GMD1	REAL	ARRAY	GMD1F	REFS	6	DEFINED	18
0 GMD1	REAL	ARRAY	GMD1F	REFS	6	DEFINED	19
0 GMD1	REAL	ARRAY	GMD1F	REFS	6	DEFINED	20

COMMON BLOCKS - BIAS NAME(LENGTH)

COMMON BLOCKS	LENGTH	MEMBERS	BIAS NAME(LENGTH)
NC1	2	0 NC1	(2)
NC2	4	0 NC2	(4)
NC3	4	0 NC3	(4)
NC5	4	0 NC5	(4)
CA1	6	0 CA1	(6)
CA2	12	0 CA2	(12)
CA3	12	0 CA3	(12)
CA5	16	0 CA5	(16)
CHOF	6	0 CHOF	(6)
CA4	6	0 CA4	(6)
CZPF	35	0 CZPF	(35)
CZ2F	35	0 CZ2F	(35)
GMPF	35	0 GMPF	(35)
CH2F	35	0 CH2F	(35)
CY4F	36	0 CY4F	(36)
GN4F	36	0 GN4F	(36)
CL4F	21	0 CL4F	(21)
CL2F	21	0 CL2F	(21)
CZDF	35	0 CZDF	(35)
CHDF	35	0 CHDF	(35)
CH3F	36	0 CH3F	(36)
CLPF	36	0 CLPF	(36)
CLDF	21	0 CLDF	(21)
CKOF	6	0 CKOF	(6)

BLOCK DATA 7474 OPT 1 FIM 4.2475067 05/95/75-16.16.23. PAGE 4

STATISTICS

PROGRAM LENGTH 03 0
CN LABELED COMMON LENGTH 7519 489

```

SUBROUTINE MCARLO(RNSTRT,MODE,ITSNDX)
COMMON C(100)
EQUIVALENCE (C( 50), RLH)
EQUIVALENCE (C(151), RX)
EQUIVALENCE (C(157), RY)
EQUIVALENCE (C(200), T)
EQUIVALENCE (C(156), VHC)
EQUIVALENCE (C(155), VMC2)
EQUIVALENCE (C(174), ZNC)
EQUIVALENCE (C(175), ZMC2)
EQUIVALENCE (C(236), OT)
EQUIVALENCE (C(276), NTH)
EQUIVALENCE (C(275), TM)
EQUIVALENCE (C(278), TRMS2)
EQUIVALENCE (C(279), TRMS)
EQUIVALENCE (C(203), THU)
EQUIVALENCE (C(201), TVH)
EQUIVALENCE (C(202), TSIG)
EQUIVALENCE (C(351), ISCT)
EQUIVALENCE (C(351), SIGMA)
EQUIVALENCE (C(354), SIGLB)
EQUIVALENCE (C(359), SIGUB)
EQUIVALENCE (C(363), ISNDX)
EQUIVALENCE (C(374), IOIST)
EQUIVALENCE (C(311), RANSTT)
EQUIVALENCE (C(372), ITCT)
EQUIVALENCE (C(373), TSJMA)
EQUIVALENCE (C(373), LBI)
EQUIVALENCE (C(373), TUB)
EQUIVALENCE (C(373), ITNDX)
EQUIVALENCE (C(373), ITOIST)
EQUIVALENCE (C(373), ISPER)
EQUIVALENCE (C(373), TYPPE)
EQUIVALENCE (C(373), TPIG)
EQUIVALENCE (C(313), ITNDX2)
EQUIVALENCE (C(383), TNSST)
DIMENSION SIGMA(40), SIGLB(40), SIGUB(40), ISNDX(40), IOIST(40)
*TSPE(10), TYPPE(10), TPIG(10), TUB(10), ITNDX(10), ITNDX2(10), TNSST(10)
DIMENSION SVC(40), SVCT(40), IOISTT(7)
DIMENSION NTH(10), TH(10), TRMS2(10), TRMS(10), THU(10), TVH(10)
1 TSIG(10)
DATA CFEITY/10HR
DATA INIT/0.0/
DATA CCEFL/13.0537351/
DATA COEF2/165.4365343/
DATA COEF3/23.10344022/
DATA LTCT/0/
DATA C(151), IA=1, 7/6HNORMAL, 7HUNIFORM, 7H2-ORDER, 7H2-ORDER, 7H
*1-ORDER, 7H2-ORDER, 7H2-ORDER/
RNSTRT = RANSTT
I = ITSNDX
IF(MODE.EQ.2) GO TO 300
IF(MODE.NE.-1) GO TO 61
WRITE(6,210)
WRITE(6,210)

```


SUBROUTINE MCARLO 74474 OPT=1 05/15/75 16.15.27. PAGE 4

175 C DETERMINE THE NORMALLY DISTRIBUTED IB TH ERROR MCARLO 173
C SOURCE MONTE CARLO VALUE. MCARLO 174
C MCARLO 175
C MCARLO 176
C MCARLO 177
C MCARLO 178
C MCARLO 179
C MCARLO 180
C MCARLO 181
C MCARLO 182
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C MCARLO 217
C MCARLO 218
C MCARLO 219
C MCARLO 220
C MCARLO 221
C MCARLO 222
C MCARLO 223
C MCARLO 224
C MCARLO 225
C MCARLO 226
C MCARLO 227
C MCARLO 228
C MCARLO 229

180 C CALL NORM(R4,XL,XU,ZMU,SGMA,RNSTRT)
C C(JM)=RX
C GO TO 309

304 CONTINUE

185 C DETERMINE THE UNIFORMLY DISTRIBUTED IB TH ERROR
C SOURCE MONTE CARLO VALUE.

190 C CALL RANJ4(LV,RNSTRT,RX)
C ZMU=SVCT(I3)
C IF(JU,NE,JM)-ZMU=C(JJ)
C C(JM) = SVCT(I3) + (RX*(IJB(I3) - YLB(I3)) + YLB(I3)) *TSSMA(I3)
C GO TO 309

195 C DETERMINE THE CORRELATED NORMAL IB TH ERROR SOURCE
C MONTE CARLO VALUE.

305 IF(MODE,NE,4) GO TO 330
GO TO 1000

200 330 CALL NCR4(RK,-3.0,3.0,1.0,RVSTRT)
C YMC = TMU(I3)
C YMC2 = TRMS(I3)
C GO TO 309

205 340 IF(MODE,NE,4) GO TO 341
GO TO 1000

341 CALL NCR4(RK,-3.0,3.0,1.0,RVSTRT)
C ZMC = TMU(I3)
C ZMC2 = TRMS(I3)
C GO TO 309

210 350 IF(MODE,NE,4) GO TO 351
C TMU(I3) = 0
C TRMS2(I3) = 0
C GO TO 1000

215 351 CALL NORM(RL4,-3.0,3.0,1.0,RNSTRT)
309 CONTINUE
C TMU(I3) = TMU(I3) + 1
C TRMS2(I3) = (TRMS2(I3) + 2*(JU)*C(JJ))

220 C CALCULATE TIME SERIES ROOT MEAN SQUARE
C TRMS(I3) = SQRT(TRMS2(I3)/NTM(I3))

225 C CALCULATE TIME SERIES MEAN VALUES
C TMU(I3) = TMU(I3)/NTM(I3)
C GO TO 1000

SUBROUTINE MCARLO 74/74 OPT=1 FTN 4.2+75867 05/85/75 16.16.27. PAGE 5

```

230      ENTRY MCARLX
      WRITE(6,7443)
      DO 1061 I3=1,ITCT
      C
      C      CALCULATE TIME SERIES VARIANCE
      C
      C      TVH(I8) = TRMS(I8)*TRMS(I8) - TVH(I8)*TVH(I8)
      C
      C      CALCULATE TIME SERIES STANDARD DEVIATION
      C
      C      TSIG(I8) = Sqrt(TVM(I8))
      C
      C      WRITE(6,7443) ITNDX(I8),TVM(I8),TSIG(I8),TRMS(I8)
      1061 CONTINUE
      7446 FORMAT(30X,30.1YDNT CARLO TIME SERIES VALUES//,
      245      1 26X,7HC-INDEX,5X,4HMEAN,6X,6HVARIANCE,4X,7HSTD DEV,5X,3HRMS/)
      7443 FORMAT(25X,15.0X,F8.3,4X,F8.3,4X,F8.3,4X,F8.3)
      GO TO 1000
      390 WRITE(6,8821)ITDIST(I8)
      8821 FORMAT(1X,24HUNRECOGNIZED DISTRIBUTION NO.,1X,16,1X,7HEVENTED)
      1006 RETURN
250      MCARLO 251
      MCARLO 230
      MCARLO 231
      MCARLO 232
      MCARLO 233
      MCARLO 234
      MCARLO 235
      MCARLO 236
      MCARLO 237
      MCARLO 238
      MCARLO 239
      MCARLO 240
      MCARLO 241
      MCARLO 242
      MCARLO 243
      MCARLO 244
      MCARLO 245
      MCARLO 246
      MCARLO 247
      MCARLO 248
      MCARLO 249
      MCARLO 250
      MCARLO 251

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SUBROUTINE MCARLO 74/74 OPT=1 FTN 4.2+75867 05/85/75 16.16.27. PAGE 6

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CARD NR. SEVERITY DETAILS DIAGNOSIS OF PROBLEM
235      I      ITCT      THIS STATEMENT MAY REDEFINE A CURRENT LOOP CONTROL VARIABLE OR PARAMETER.
239      I      ITCT      THIS STATEMENT MAY REDEFINE A CURRENT LOOP CONTROL VARIABLE OR PARAMETER.

```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS		DEF LINE	REFERENCES																		
306 MCARLX		229	249																		
VARIABLES		SN	TYPE	RELOCATION																	
0	G	REAL	ARRAY	1	2	3	4	5	6	7	8										
410 COEF1		* REAL			REFS	9															
411 COEF2		* REAL			REFS	10															
412 COEF3		* REAL			REFS	17															
407 CPERTY		* REAL			REFS	25															
5147 OT		REAL			REFS	33															
573 I		INTEGER			REFS	127															
					REFS	143															
					REFS	79															
					REFS	88															
601 IS		INTEGER			REFS	46															
					REFS	47															
					REFS	48															
					REFS	44															
					REFS	11															
					REFS	71															
					REFS	81															
					REFS	93															
601 IS		INTEGER			REFS	129															
					REFS	158															
					REFS	169															
					REFS	212															
					REFS	233															
					REFS	5241															
7131 IOIST		INTEGER			REFS	24															
725 IOIST		INTEGER			REFS	40															
734 INIT		INTEGER			REFS	41															
6667 ISDXT		INTEGER			REFS	19															
7210 ITCT		INTEGER			REFS	23															
7262 ITDXT		INTEGER			REFS	26															
7250 ITDXT		INTEGER			REFS	31															
7344 ITDXT		INTEGER			REFS	30															
					REFS	35															
					REFS	53															
					REFS	129															
602 ITI		* INTEGER			REFS	73															
574 JU		INTEGER			REFS	218															
					REFS	2189															
					REFS	154															
					REFS	90															
603 JM		INTEGER			REFS	154															
413 LYCT		* INTEGER			REFS	49															
0 MODE		INTEGER			REFS	54															
					REFS	210															
5314 NTM		INTEGER			REFS	12															
					REFS	211															
6666 RANSTI		REAL			REFS	25															
73 RLW		REAL			REFS	3															
0 RNSIRI		REAL			REFS	77															
					REFS	215															
3030 RX		REAL			REFS	4															
					REFS	17															
3042 RY		REAL			REFS	5															
576 SGMA		REAL			REFS	97															
6741 SIGLB		REAL			REFS	21															
6671 SIGMA		REAL			REFS	20															

SUBROUTINE MCARLO 7474 0111									
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VARIABLES	SN	TYPE	RELOCATION						
7011 SIGUB	REAL	ARRAY	/ /	REFS	22	37	79	84	94
605 SVC	REAL	ARRAY	/ /	REFS	40	79	96	94	96
				DEFINED	73				
655 SVCT	REAL	ARRAY	/ /	REFS	40	163	160	190	DEFINED
3717 T	REAL	ARRAY	/ /	REFS	6				162
7224 TLB	REAL	ARRAY	/ /	REFS	28	38	165	2*198	
5326 TM	REAL	ARRAY	/ /	REFS	13	42	218	227	DEFINED
5364 THU	REAL	ARRAY	/ /	REFS	16	42	201	207	212
				DEFINED	227				241
7332 INKST	REAL	ARRAY	/ /	REFS	36	38	127	145	166
				DEFINED	125	143	158		
7320 TPSIG	REAL	ARRAY	/ /	REFS	34	38	148		
5352 TRMS	REAL	ARRAY	/ /	REFS	15	42	202	200	2*235
				DEFINED	223				241
5340 TRMS2	REAL	ARRAY	/ /	REFS	14	42	219	223	DEFINED
7212 TSGMA	REAL	ARRAY	/ /	REFS	27	38	167	190	213
5410 TSIG	REAL	ARRAY	/ /	REFS	18	42	241	DEFINED	239
7274 TSPER	REAL	ARRAY	/ /	REFS	32	38	143	145	167
7236 TUB	REAL	ARRAY	/ /	REFS	29	38	156	190	
5376 TVM	REAL	ARRAY	/ /	REFS	17	42	239	241	DEFINED
7306 TYPPER	REAL	ARRAY	/ /	REFS	33	38	136		235
575 XL	REAL	ARRAY	/ /	REFS	87	149	177	DEFINED	82
600 XMU	REAL	ARRAY	/ /	REFS	87	147	149	177	DEFINED
				DEFINED	164				86
577 XU	REAL	ARRAY	/ /	REFS	87	149	177	DEFINED	94
3033 YMC	REAL	ARRAY	/ /	REFS	7	DEFINED	201		166
3034 YMC2	REAL	ARRAY	/ /	REFS	8	DEFINED	202		
3045 ZMC	REAL	ARRAY	/ /	REFS	9	DEFINED	207		
3046 ZMC2	REAL	ARRAY	/ /	REFS	10	DEFINED	208		
604 ZMU	REAL	ARRAY	/ /	DEFINED	188				
						189			
-FILE NAMES									
TAPE6	FMT	MODE	WRITES	56	57	91	94	96	230
									241
									247
EXTERNALS									
NORM	TYPE	ARGS	REFERENCES						
RAMMIM	3	87	149	177	200	236	235		
SQRT	REAL	1 LIBRARY	223	239					
-ST. ITEMENT LABELS									
DEF LINE	REFERENCES								
71 1	92	91	89						
116 13	97	95							
30 60	75	71							
21 81	59	55							
45 100	81	75							
63 101	90	81							
117 300	124	54							
215 304	181	163							
234 305	198	163							
270 309	216	173							
137 311	145	136							
152 312	159	144							
237 330	200	193							
246 340	204	169							
251 341	235	204							
260 350	210	169							
265 351	215	213							

STATEMENT LABELS	DEF LINE	REFERENCES
342 300	247	2*159
105 737	95	93
346 1000	249	59
0 1001	242	245
0 1306	INACTIVE	231
207 1307	171	165
465 2100	FMT	105
504 2101	FMT	109
472 2103	FMT	107
512 2105	FMT	110
447 5000	FMT	98
534 7440	FMT	243
547 7443	FMT	245
560 8821	FMT	248

LOOPS LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES
320 1001	IB	231 242	228	EXT REFS

COMMON BLOCKS	LENGTH	MEMBERS	BIAS NAME(LENGTH)
/ /	3830	0 C	(3830)

EQUIV CLASSES	LENGTH	MEMBERS	BIAS NAME(LENGTH)
C	3830	53 1LH	(1)
		1564 Y422	(1)
		1574 Y432	(1)
		2764 MY4	(10)
		2794 RMS	(10)
		2824 ISLG	(10)
		3513 SISMA	(40)
		3633 ISWDX	(40)
		3722 ISOMA	(10)
		3752 IYJX	(10)
		3782 IYPER	(10)
		3812 IYDX2	(10)
		1550 RX	(1)
		1570 RV	(1)
		1939 I	(1)
		2774 TM	(10)
		2904 TMJ	(10)
		3510 RANSTT	(1)
		3553 SLSLB	(40)
		3673 IDIST	(40)
		3732 TLB	(10)
		3752 IIDIST	(10)
		3792 IPSIG	(10)
		1563 YMC	(1)
		1573 ZMC	(1)
		2663 OT	(1)
		2784 YAMS2	(10)
		2814 TVM	(10)
		3511 ISGCT	(1)
		3593 SIGU3	(40)
		3720 ITCT	(1)
		3742 TUB	(10)
		3772 TSPE2	(10)
		3802 TMSF	(10)

STATISTICS	PROGRAM LENGTH	CM BLANK COMMON LENGTH
	10348	516
	73663	3830

```

SUBROUTINE CEPAS(NP,IBVNSM,IPL0T,XLAMBD,KSSIG,CEPSIG,PSIZE)
COMMON/CEPAS/X(100),Y(100)
DIMENSION C(PSIG(6))
DIMENSION GRIF(100)
REAL KSSIG
INTEGER CEPSIG
WRITE(6,2003)
2003 FORMAT(141,394CEPAS-PARAMETER-CONTROL-CARD-INPUT-DATA-)
WRITE(6,2004)NP,IBVNSM,IPL0T,XLAMBD,KSSIG,(CEPSIG(I),I=1,5)
2004 FORMAT(14,316,214,F10.3),516)
DO 5 I=1,5
2005 FORMAT(14,316,214,F10.3),516)
IF(CEPSIG(I).GT.0) GO TO 5
CEPSIG(I)=-1
5 CONTINUE
NUC=INF-11/15
NUC=NUC+1
WRITE(6,2000)
2000 FORMAT(14,2HX=)
2001 WRITE(6,2001)(X(I),I=1,NP)
2001 FORMAT(10(2X,F7.3))
WRITE(6,2002)
2002 FORMAT(14,2HY=)
2002 WRITE(6,2001)(Y(I),I=1,NP)
CALL CEPP(X,Y,NP,KSSIG,XLAMBD,IBVNSM,CEPSIG,IPL0T,PSIZE)
RETURN
END

```

SYMBOLIC REFERENCE MAP (R33)

ENTRY POINTS DEF LINE REFERENCES
3 CEPAS 1 27

VARIABLES SN TYPE RELOCATION

CEPSIG	INTEGER	ARRAY	F.P.	REFS
161 CRTT	REAL	*UNDEF		1
157	INTEGER			4
0 IBVNSM	INTEGER			14
0 IPLOT	INTEGER			15
156 JJ	INTEGER			26
0 KSSIG	REAL			26
0 NP	INTEGER			9
160 NUG	INTEGER			17
0 PSIZE	REAL			18
0 X	REAL			21
0 XLAMB0	REAL			26
144 Y	REAL			26

FILE NAMES MODE

TAPES	TYPE	ARGS	REFERENCES	ARITES
EXTERNALS			9	7
CEPP			26	

STATEMENT LABELS DEF LINE REFERENCES

DEF LINE	REFERENCES
17 5	13
134 2000	13
142 2001	13
150 2002	21
75 2003	23
125 2004	8
117 2005	11

LOOPS LABEL INDEX FROM-TO LENGTH PROPERTIES

INDEX	FROM-TO	LENGTH	PROPERTIES
15 5	13 16	38	INSTACK

COMMON BLOCKS LENGTH MEMBERS BIAS NAME(LENGTH)

CEPASS	LENGTH	MEMBERS	BIAS NAME(LENGTH)
200	200	100 Y	(100)

STATISTICS

PROGRAM LENGTH	CM LABELED COMMON LENGTH
3253	213
3104	200

```

SUBROUTINE CEPP(X,Y,NP,KSSIG,XLAMBD,IBVNSM,CEFSIG,IPLDT,PSI/E)
  REAL KSSIG
  INTEGER CEPSIG
  DIMENSION ZXX(100),ZYY(100)
  DIMENSION TITLE(5),TITLE2(5)
  DIMENSION ICHI(6)
  DIMENSION CHI2(6,53)
  DIMENSION X(100),Y(100),SORFX(100),DIST(100),CEPSIG(6),ICONREF(6),
  * RCNFI(6),RCNPF(6)
  DATA ISKSW/3/
  DATA (CHI2(I,I),I=1,50)/0.0201,0.297,0.072,1.63,2.56,3.37,4.66,
  * 5.81,7.01,8.25,9.54,10.9,12.2,13.6,15.0,16.5,17.8,19.2,20.7,22.2,
  * 23.7,25.1,26.7,28.2,29.7,31.2,32.8,34.3,35.9,37.5,39.1,40.6,42.2,
  * 43.4,45.4,47.1,48.7,50.3,51.9,53.5,55.2,56.8,58.5,60.1,61.8,63.4,
  * 65.1,66.7,68.4,70.1,71.7,73.4,75.1,76.9,78.7,80.5,82.4,84.2,86.1,87.9/
  DATA (CHI2(I,I),I=1,50)/0.133,0.711,1.69,2.73,3.94,5.23,6.57,
  * 7.95,9.39,11.3,12.3,13.8,15.4,16.5,18.5,20.1,21.7,23.3,24.9,26.5,
  * 28.1,29.8,31.4,33.1,34.8,36.4,38.1,39.8,41.5,43.2,44.9,46.6,48.3,
  * 50.0,51.7,53.5,55.2,56.9,58.7,60.4,62.1,63.8,65.5,67.2,68.9,70.6,
  * 72.3,74.0,75.7,77.4/
  DATA (CHI2(I,I),I=1,50)/0.211,1.06,2.20,3.49,4.87,6.3,7.79,9.31,
  * 10.9,12.4,14.1,15.7,17.3,18.9,20.6,22.3,24.0,25.7,27.3,29.1,
  * 30.8,32.5,34.2,35.9,37.7,39.4,41.2,42.9,44.6,46.5,48.2,50.0,51.8,
  * 53.5,55.3,57.1,58.9,60.7,62.5,64.3,66.1,67.9,69.7,71.5,73.3,75.1,
  * 76.9,78.7,80.5,82.4/
  DATA (CHI2(I,I),I=1,50)/3.4,6.1,6.5,3.07,4.5,6.19,7.81,9.47,11.2,
  * 12.9,14.5,16.3,18.1,19.8,21.5,23.4,25.1,26.9,28.7,30.5,32.3,34.2,
  * 36.0,37.8,39.6,41.4,43.3,45.1,47.0,48.8,50.6,52.5,54.3,56.2,58.0,
  * 59.9,61.8,63.6,65.5,67.3,69.2,71.1,72.9,74.8,76.7,78.6,80.4,82.3,
  * 84.2,86.1,87.9/
  DATA (CHI2(I,I),I=1,50)/0.713,2.19,3.83,5.53,7.27,9.03,10.8,12.6,
  * 14.4,16.3,18.1,19.9,21.6,23.4,25.2,27.0,28.8,30.6,32.4,34.2,
  * 36.0,37.8,39.6,41.4,43.2,45.0,46.8,48.6,50.4,52.2,54.0,55.8,57.6,
  * 59.4,61.2,63.0,64.8,66.6,68.4,70.2,72.0,73.8,75.6,77.4,79.2,81.0,
  * 82.8,84.6,86.4,88.2/
  DATA (TITLE(I),I=1,6)/HDEP CO,6HMFIDEV,6HCE CIR,6HMLE FO,
  * 6HR LAMB,6HDA = /
  DATA (TITLE2(I),I=1,6)/HDEP CO,6HMFIDEV,6HCE CIR,6HMLE FO,
  * 6HR LAMB,6HDA = /
  DATA ICONREF/99,99,99,99,99,99/
  DATA SORFX/100*(0.0)/
  C
  C * * * X= ARRAY OF K-COMPONENT OF MISS DISTANCES
  C * * * Y= ARRAY OF Y-COMPONENT OF MISS DISTANCES
  C * * * NP= NUMBER OF POINTS
  C * * * KSSIG= SIGNIFICANCE LEVEL FOR K-S TEST DESIRED -- SET
  C * * * NEGATIVE IF NO K-S TEST DESIRED
  C * * * XLAMBD= (NDEPRM ) / (MISSILE CEP) --
  C * * * SET TO ZERO IF NO ESTIMATE OF PROGRAM CEP IS MADE
  C * * * IBVNSM=1 IF DESIRE TO USE BIVARIATE NORMAL ASSUMPTION
  C * * * REGARDLESS OF OUTCOME OF K-S TEST --- SET NOT = 1 TO USE
  C * * * BIVARIATE NORMAL ONLY IF K-S TEST DOES NOT REJECT
  C * * * ASSUMPTION OF NORMALITY. IF NOT =1, AND DATA FAILS K-S TEST
  C * * * FOR NORMALITY, CEP WILL BE
  C * * * CALCULATED AS THE RADIUS, R, OF A CIRCLE CONTAINING
  C * * * ONE-HALF OF THE SAMPLE POINTS.
  C * * * CEPSIG= SIGNIFICANCE LEVELS AT WHICH CEP CONFIDENCE

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C      INTERVAL(S) PRINT IS DESIRED.  P1EL30 TO NEGATIVE NUMBERS
C      IN CALLING PROGRAM BEFORE ENTERING DESIRED CONFIDENCE LEVELS
C      ENTER AS AN INTEGER (IN PERCENT) -- E.S., IF DESIRE
C      R(1.39), R(0.30), AND R(0.70), ENTER (FOR EXAMPLE)
C      CESSIG(1)=90, CESSIG(2)=99, AND CESSIG(3)=70.  NO ORDER
C      NEEDS TO BE OBSERVED.
C      * * * I PLOT= 1 FOR PLOTS OF CEPUS! AND POINTS, NOT =1 OTHERWISE
C      KSSIG=0.05
C      MCONP=C
C      EPSLN=.10011
C      895C CONTINUE
C      WRITE(6,1013)
C      1015 FORMAT(2H1)
C      IF(NP.LE.0) GO TO 300
C      * * * CALCULATE SAMPLE SIGMA-X, SIGMA-Y, X-MEAN, AND Y-MEAN
C      SUMX2=0.
C      SUMY2=0.
C      XBAR=C.
C      YBAR=C.
C      DO 1 I=1,NP
C      SUMX2=SUMX2 + X(I)**2
C      SUMY2=SUMY2 + Y(I)**2
C      XBAR=XBAR + X(I)
C      YBAR=YBAR + Y(I)
C      1 XBAR = XBAR / NP
C      YBAR = YBAR / NP
C      SXHAT2=(SUMX2 - (XBAR**2)*NP)/(NP - 1)
C      SYHAT2 = (SUMY2 - (YBAR**2)*NP)/(NP-1)
C      SXHAT= SQRT(SXHAT2)
C      SYHAT = SQRT(SYHAT2)
C      * * * KOLMOGOROV-SMIRNOV TEST FOR NORMALITY
C      * * * CHECK X
C      * * * CHECK Y
C      NI=0
C      CALL KSTEST(X,NP,KSSIG,SXBAR,SYHAT,NI)
C      NIX=NI
C      * * * CHECK X
C      * * * CHECK Y
C      CALL KSTEST(Y,NP,KSSIG,YBAR,SYHAT,NI)
C      NIY=NI
C      IF(NIX.GT.0) WRITE(6,1001)KSSIG
C      1001 FORMAT(1X,51H-COMPONENT OF MISS DISTANCE FAIL K-S TEST FOR NORMAL
C      *ITY AT *F10.5,2X,18H-SIGNIFICANCE LEVEL)
C      WRITE(6,1073)
C      1073 FORMAT(1X,51H-COMPONENT OF MISS DISTANCE FAIL K-S TEST FOR NORMAL
C      *ITY AT *F10.5,2X,18H-SIGNIFICANCE LEVEL)
C      1002 FORMAT(1X,51H-COMPONENT OF MISS DISTANCE FAIL K-S TEST FOR NORMAL
C      *ITY AT *F10.5,2X,18H-SIGNIFICANCE LEVEL)
C      IF(18HVS4.E4.1) GO TO 450

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115      C      IF(INIX-ST-0.02-NY-GT-0) GO TO 430
116      C      * * * DETERMINE CONSTANT XK FOR ELLIPTICAL TO CEP CONVERSION
117      C
118      450 SSM/N=AMIN1(SHAT,SYHAT)
119      SSMAX=AMAX1(SHAT,SYHAT)
120      RATIOX=SSMIN/SSMAX
121      IF(RATIOX-GE-0.3) GO TO 102
122      XK=0.9938*RATIOX**2 - 0.0495*RATIOX + 0.675
123      CEP=XK*SSMAX
124      GO TO 121
125      102 CEP=0.615*SSMIN + 0.362*SSMAX
126      C
127      C      * * * CALCULATE CONFIDENCE INTERVALS
128      C
129      IF(INP-GT-1) GO TO 545
130      WRITE(6,1073)
131      WRITE(6,1078)
132      WRITE(6,1112)NP
133      1112 FORMAT(IX,8HNO. CONFIDENCE INTERVALS CALCULATED BECAUSE NUMBER OF
134      *POINTS, NP=16,14HIS LESS THAN 2)
135      GO TO 526
136      545 CONTINUE
137      121 NCONF=0
138      IF(CEPSIG(1).LE.0) GO TO 526
139      DO 4 I=1,5
140      ICH1(I)=-1
141      IF(CEPSIG(I).LE.0) GO TO 4
142      NCONF=NCONF + 1
143      IF(CEPSIG(I).EQ.99) ICH1(I)=1
144      IF(CEPSIG(I).EQ.95) ICH1(I)=2
145      IF(CEPSIG(I).EQ.90) ICH1(I)=3
146      IF(CEPSIG(I).EQ.80) ICH1(I)=4
147      IF(CEPSIG(I).EQ.70) ICH1(I)=5
148      IF(ICH1(I).GT.0) GO TO 44
149      WRITE(6,1007)CEPSIG(I)
150      NCONF=NCONF - 1
151      44 IF(CEPSIG(I)+1).LE.0) GO TO 526
152      4 CONTINUE
153      1007 FORMAT(IX,2JHCONFIDENCE LEVEL OF -IX,2HENTERED,WHICH-15-NOT-14
154      *BLEQ,2X,31H40 CONFIDENCE INTERVAL COMPUTED)
155      526 CEPS=CEP
156      NU=2*(NP - 1)
157      NUS=NU
158      MU=NU/2
159      IF(NCONF.LE.0) GO TO 528
160      DO 5 I=1,NCONF
161      J=ICH1(I)
162      5 RCONF1(I)=CEP*SQRT(NUS/CH12(J,MU))
163      IF(XLAMBD-LT-EPS-N) GO TO 528
164      257 CEPS=CEP/SQRT(1+XLAMBD**2)
165      IF(NCONF.EQ.0) GO TO 528
166      DO 6 I=1,NCONF
167      J=ICH1(I)
168      6 RCONF2(I)=RCONF1(I)/SQRT(1+XLAMBD**2)*(1 - CH12(J,MU)/NUS))
169      WRITE(6,1073)
170      528 WRITE(6,101)CEP,MU

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236 C * * * * * SORT DISTANCES IN INCREASING ORDER
C
      ND=NP
      ISV=3
      NS=0
235 402 COMP = 10**6
      DO 3 I=1,ND
      IF (DIST(I).GE.COMP) GO TO 3
      ISV=1
      COMP=DIST(I)
240 3 CONTINUE
      NS=NS+1
      SORTX(NS)=COMP
      DIST(ISV)=DIST(NS)
      ND=ND-1
      IF (ND.GT.1) GO TO 402
      NS=NS+1
      SORTX(NS)=DIST(1)
245 C * * * * * DETERMINE IF NUMBER OF POINTS, NP, IS EVEN OR ODD
C
      ND=NP/2
      NS=NP-2*ND
      IF (NS.EQ.0) GO TO 403
255 C * * * * * NUMBER OF POINTS IS EVEN. SET CEP TO A DISTANCE WHICH IS
C
      HALFAY BETWEEN THE INTERIOR POINT CLOSEST TO THE 50 PER-
      CENT CIRCLE AND THE EXTERIOR POINT CLOSEST TO THE 50 PER-
      CENT CIRCLE.
260 C
      CEP=(SORTX(ND)+SORTX(ND+1))/2.
      GO TO 404
265 C * * * * * NUMBER OF POINTS IS ODD. SET CEP TO THE MEDIAN DISTANCE.
C
      403 CEP=SORTX(ND+1)
      404 WRITE(6,100) CEP
      1004 FORMAT(1X,4HCEP=,F10.5,2X,67HDATA FAILED K-S NORMALITY TEST,NO
      *CONFIDENCE INTERVAL CALCULATED)
      GO TO 500
270 300 WRITE(6,1001)
      1000 FORMAT(1X,42HROUTINE CEP ENTERED WITH NO. POINTS = 01
      GO TO 520
275 C * * * * * PLOT CEP(S), CONFIDENCE INTERVALS, AND POINTS
C
      500 DX=SORTX(3)*2 + YBAR**2)
      WRITE(6,1073)
      WRITE(6,1073)
280 1113 FORMAT(1X,17HCEP CENTROID AT (,F5.3,1H,,F5.3,1H),10X,28HDISTANCE F
      *FROM TARGET CENTER,F5.3)
      IF (PLGT.EQ.0) GO TO 520
      IF (NCONF.LE.0) GO TO 501
      DO 27 KOC=1,NCONF
      MCARLO 504
      MCARLO 505
      MCARLO 506
      MCARLO 507
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      MCARLO 511
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      MCARLO 558
      MCARLO 559
      MCARLO 560

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SUBROUTINE CEPP 74/74 OPT=1 FIN 4.2+75067 05/85/75 16.16.33. PAGE 6

```

      I=I+1(KOCH)
      DO 556 KNN=L,NP
      ZXX(KNN)=X(KNN)
      558 ZYY(KNN)=Y(KNN)
      CALL FPLOT(ZXX,ZYY,NP,CEP,I,CONF1(KOCH),TITLE1,XBAR,
      *YBAR,G.,PSIZE)
      IF(XLAMBD.LT.EPS.N) GO TO 27
      DO 557 KNN=L,NP
      ZXX(KNN)=X(KNN)
      557 ZYY(KNN)=Y(KNN)
      CALL FPLOT(ZXX,ZYY,NP,CEPS,I,CONF2(KOCH),TITLE2,XBAR,
      *YBAR,XLAMBD,PSIZE)
      27 CONTINUE
      GO TO 520
      501 CALL FPLOT(X,Y,NP,CEP,D,D.,TITLE1,XBAR,YBAR,D.,PSIZE)
      520 CONTINUE
      RETURN
      END

```

SUBROUTINE CEPP 74/74 OPT=1 FIN 4.2+75067 05/85/75 16.16.33. PAGE 7

CARD NR. SEVERITY DETAILS DIAGNOSIS OF PROBLEM

DATA VARIABLE LIST EXCEEDS ITEM LIST EXCESS VARIABLES NOT INITIALIZED.

VARIABLES			SM	TYPE	RELOCATION					
2661	RCONF1	REAL		REFS	8	169	132	290	DEFINED	153
2667	RCONF2	REAL		REFS	8	212	296	DEFINED	169	
1310	SBAR	REAL		REFS	99					
2343	SORTX	REAL		REFS	8	2*261	256	DEFINED	41	262
1314	SSMAX	REAL		REFS	121	124	126	DEFINED	120	
1313	SSMIN	REAL		REFS	121	126	DEFINED	119		
1276	SUMX2	REAL		REFS	81	87	DEFINED	76	81	
1277	SUMY2	REAL		REFS	82	88	DEFINED	77	82	
1305	SXMAT	REAL		REFS	99	119	120	DEFINED	89	
1303	SXMAT2	REAL		REFS	99	DEFINED	87			
1306	SYMAT	REAL		REFS	184	119	120	DEFINED	98	
1304	SYMAT2	REAL		REFS	90	DEFINED	88			
1645	TITLE1	REAL		REFS	5	230	300	DEFINED	36	
1653	TITLE2	REAL		REFS	5	236	DEFINED	38		
0	X	REAL		REFS	8	81	83	99	175	220
1300	XBAR	REAL		REFS	234	300	DEFINED	1		
1316	XK	REAL		REFS	93	85	97	175	228	280
0	XLAMBU	REAL		REFS	124	300	DEFINED	78	83	85
						UNDEFINED	123			
					154	165	169	196	230	292
0	Y	REAL		REFS	1	82	84	104	175	228
					235	300	DEFINED	1		
1301	YBAR	REAL		REFS	94	86	88	104	175	228
133F	ZX	REAL		REFS	290	296	300	DEFINED	79	84
1501	ZY	REAL		REFS	4	290	296	DEFINED	288	295
					4	290	296	DEFINED	289	
FILE NAMES										
TAPE6		MODE								
FMT										
			136	109	110	131	132	133		
			153	176	182	183	184	188		
			193	197	198	205	206	207		
			203	212	213	267	271	278		
			280					279		

FILE NAMES	MODE	REFERENCES	70	136	109	110	111	131	132	133
TAPE6	FMT	REFERENCES	151	175	171	176	182	184	186	188
KSTEST	6	93	296	300	163	155	169	175	220	277
PPLOT	11	297	90	163	155	169	175	220	277	
SORT	REAL	1 LIBRARY	83	90	163	155	169	175	220	277

EXTERNALS	TYPE	ARGS	REFERENCES	70	136	109	110	111	131	132	133
KSTEST	6	93	296	300	163	155	169	175	220	277	
PPLOT	11	297	90	163	155	169	175	220	277		
SORT	REAL	1 LIBRARY	83	90	163	155	169	175	220	277	

INLINE FUNCTIONS	TYPE	ARGS	DEF LINE	REFERENCES	70	136	109	110	111	131	132	133
AXIAL	REAL	6 INTRIN	120									
AXIAL	REAL	6 INTRIN	119									

STATEMENT LABELS	DEF LINE	REFERENCES	84	81	229	227	243	235	237	162	292
0 1	84	81									
0 2	229	227									
45 3	243	235									
222 4	153	141									
0 5	163	161									
0 6	169	167									
0 8	176	174									
505 27	298	283									
217 44	152	143									
132 102	126	122									
0 103	124	125									
146 121	130	125									

STATEMENT LABELS		DEF LINE REFERENCES	
0 257	INACTIVE	165	
592 300		271	72
423 400		227	113
442 402		235	245
475 403		266	253
477 404		267	262
116 450		119	114
585 500		277	196
570 501		300	284
577 520		273	239
225 526		156	152
277 528		171	135
357 529		195	178
0 530	INACTIVE	213	
0 539	INACTIVE	203	
146 545		137	131
0 557		295	233
0 558		203	207
1225 1000	FMT	272	271
675 1001	FMT	107	106
722 1002	FMT	112	111
1210 1004	FMT	268	267
766 1007	FMT	154	153
1011 1010	FMT	172	171
1026 1011	FMT	177	175
1045 1012	FMT	185	184
1065 1013	FMT	189	183
1075 1014	FMT	191	210
1104 1015	FMT	193	211
1132 1016	FMT	201	212
1155 1017	FMT	203	202
067 1019	FMT	71	70
1123 1070	FMT	193	103
		205	137
747 1112	FMT	134	102
1247 1113	FMT	231	279
1056 1499	FMT	187	132
1112 1500	FMT	195	170
0 0950	INACTIVE	69	206
			209
			213
LOOPS LABEL INDEX FROM-TO LENGTH PROPERTIES			
34 1	I	80 84	78 INSTACK
152 4	* I	140 153	538 EXT REFS EXITS
235 5	* I	161 163	128 EXT REFS
268 6	* I	167 169	158 EXT REFS
302 8	* I	174 176	228 EXT REFS
424 2	* I	227 228	138 EXT REFS
451 3	* I	236 240	58 INSTACK
522 27	* KOCH	285 298	668 EXT REFS NOT INNER
530 558	KNN	287 283	38 INSTACK
551 557	KNN	293 295	38 INSTACK
STATISTICS			
PROGRAM LENGTH		27243	1692

STATEMENT LABELS	DEF LINE	REFERENCES
0 257 INACTIVE	165	
502 300	271	72
423 400	227	115
442 402	235	245
475 403	260	253
477 404	267	262
116 450	113	114
505 500	277	136
570 501	300	284
577 520	273	204 214 270
225 526	156	239
277 528	171	135
357 529	195	150 164 156
0 530 INACTIVE	213	
0 539 INACTIVE	203	
146 545	137	133
0 557	295	233
0 558	293	287
1225 1000 FMT	272	271
675 1001 FMT	117	106
722 1002 FMT	112	111
1210 1004 FMT	269	267
765 1007 FMT	154	151
1011 1010 FMT	172	171
1026 1011 FMT	177	176
1045 1012 FMT	105	104
1665 1013 FMT	199	183
1075 1014 FMT	191	210
1104 1015 FMT	193	211
1132 1016 FMT	231	212
1155 1017 FMT	209	207
667 1019 FMT	71	70
1023 1078 FMT	193	103
747 1112 FMT	134	133
1247 1113 FMT	281	231
1056 1499 FMT	197	185
1112 1500 FMT	195	209
0 0950 INACTIVE	69	194 213

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES
34	1	I	80 84	73	INSTACK
152	4	* I	146 153	538	EXT REFS EXITS
235	5	* I	161 163	128	EXT REFS
260	6	* I	167 169	158	EXT REFS
302	8	* I	174 176	223	EXT REFS
424	2	* I	227 228	138	EXT REFS
451	3	* I	236 240	53	INSTACK
522	27	* KOCH	285 298	468	EXT REFS NOT INNER
530	55A	KMN	287 289	38	INSTACK
551	557	KMK	193 295	38	INSTACK

STATISTICS
PROGRAM LENGTH

27243 1492

SUBROUTINE NORM 7/4/74 OPT=1 05/05/75 16.16.49. PAGE 2

```

SUBROUTINE NORM(RX, XL, XU, XMU, SGMA, RNSTRT)
  YLL=XMU+SGMA*XL
  XU=XMU+SGMA*XL
  CALL NORMAL(RX,XLL,XMU,XMU,SGMA,RNSTRT)
  RETURN
END

```

5

MCARLO 579
MCARLO 580
MCARLO 581
MCARLO 582
MCARLO 583
MCARLO 584

SUBROUTINE NORM 7/4/74 OPT=1 05/05/75 16.16.49. PAGE 2

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS DEF LINE REFERENCES

1 NORM 1 5

VARIABLES SM TYPE RELOCATION

0 RNSTRT REAL F.P. 4 DEFINED 1

0 RX REAL F.P. 4 DEFINED 1

0 SGMA REAL F.P. 2 DEFINED 1

30 XLL REAL F.P. 2 DEFINED 1

0 XMU REAL F.P. 4 DEFINED 2

0 XU REAL F.P. 3 DEFINED 1

31 XU REAL F.P. 4 DEFINED 3

EXTERNALS TYPE ARGS REFERENCES

NORMAL 6

STATISTICS

PROGRAM LENGTH 323 26

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SUBROUTINE KSTEST(Y,IP,KSSIG,X3AR,XX4AT,NI)
DIMENSION Y(100),CR IF(100),ISMICF(100)
REAL KSSIG
DATA NZT//
DATA DATA NUM/0/
DATA CRIT /375.0,642.0,708.0,624.0,565.0,521.0,485.0,457.0,432.0,410.0,391.0,
A 375.0,361.0,349.0,338.0,328.0,318.0,303.0,301.0,294.0,289.0,284.0,
3 280.0,275.0,270.0,264.0,258.0,252.0,248.0,242.0,238.0,236.0,234.0,
C 232.0,230.0,227.0,224.0,221.0,218.0,215.0,212.0,210.0,207.0,205.0,
0 203.0,200.0,198.0,196.0,194.0,192.0,50*192.0/
NV=NP
NI=0
KSSIG=KSSIG
NZT=5
3011 CONTINUE
NSG=0
500 FORMAT(I2)
NUM=NUM+1
527 RV=NV
YMAX=Y(1)
YS2=Y(1)*2
YMIN=Y(1)
YSUM=Y(1)
DO 1 I=2,NV
IF(YMAX-Y(I))100,100,101
100 YMAX=Y(I)
101 IF(YMIN-Y(I))106,106,102
102 YMIN=Y(I)
106 YSUM=YSUM+Y(I)
1 YS2=YS2+Y(I)*2
RV1=RV-1
S2=(YS2-YSUM*2)/RV1/RV1
S=SJRT(S2)
YMEAN=YSUM/RV
WRITE(6,363)YJM
563 FORMAT(I1X,3HCASE=NO,=,I4/)
WRITE(6,517)YMEAN,S
517 FORMAT(11X,5HMEAN=,F10.4,6HSTD.0L,=,F10.4)
NSTEPS = NV/5
SSTEP=(YMAX-YMIN)/NSTEPS
81-YMIN-SSTEP
NCUM=0
UMAX=0.
WRITE(6,433)NSTEPS,YMIN,YMAX
433 FORMAT(11X,7HNSTEPS=,I6,2X,5HYMIN=,F6.3,1X,5HYMAX=,F6.3)
DO 2 I=1,NSTEPS
81=31+SSTEP
124 OBS=81+SSTEP/0.5
125 B2=31+SSTEP
IF(I-EG,NSTEPS).82=82+0.00031
NN=3
DO 2 J=1,NV
IF(I(J)-81)3,103,103
103 IF(I(J)-82)10+3,3
104 NN=NN+1
NCUM=NCUM+1
3 CONTINUE

```

```

RNCJM=NCU4
RECUJ=RNCJM/RNV
YMINUS=OBS-YMEAN
Z=YMINUS/H/S
CALL ZTABLE(Z,FREQ,NZT)
D=ABS(FREQ-RECUJ)
IF(D-DMAX)120,121,121
121 DMAX=D
120 CONTINUE
2 CONTINUE
GRITTI = GRIT(NV)/1000.
WRITE(6,5123)DMAX,GRITTI
5123 FORMAT(1X,5MDMAX=F1)7.2X,13MCRTITICAL VAL=F10.7)
IF(DMAX-GRITTI)556,558,558
558 MSG=MSG+1
516 CONTINUE
NI=1
556 CONTINUE
RETURN
END
MCARLO 642
MCARLO 643
MCARLO 644
MCARLO 645
MCARLO 646
MCARLO 647
MCARLO 648
MCARLO 649
MCARLO 650
MCARLO 651
MCARLO 652
MCARLO 653
MCARLO 654
MCARLO 655
MCARLO 656
MCARLO 657
MCARLO 658
MCARLO 659
MCARLO 660
MCARLO 661

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SYMBOLIC REFERENCE MAP (R=31)

ENTRY POINTS	DEF LINE	REFERENCES	VARIABLES													SN	TYPE	RELOCATION	REFS	47	48	49	53	DEFINED	41	47																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
3-KSIES1	1	75	VARIABLES													SN	TYPE <td>RELOCATION</td> <td>REFS</td> <td>47</td> <td>48</td> <td>49</td> <td>53</td> <td>DEFINED</td> <td>41</td> <td>47</td>	RELOCATION	REFS	47	48	49	53	DEFINED	41	47																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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INLINE FUNCTIONS TYPE ARG DEF LINE REFERENCES
ABS REAL 1 INTRIN 63

STATEMENT LABELS	DEF LINE	REFERENCES
0 1	30	24
0 2	67	45
111 3	57	52 2*54
0 100	26	2*25
30 101	27	25
0 102	28	27
0 103	54	2*53
0 104	55	54
33 106	29	2*27
227 120	65	2*54
0 121	65	64
0 124	48	
0 125	49	
154 500	17	
0 516	73	
172 517	38	37
0 527	19	
162 563	35	35
145 566	75	71
0 568	72	2*71
0 3011	15	
205 4331	45	44
220 6123	70	63

LOOPS LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES
25 1	I	24 30	128	CPT
66 2	* I	46 67	663	EXT REFS NOT INNER
101 2	* J	52 67	318	EXT REFS

STATISTICS

PROGRAM LENGTH	5153	382
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SUBROUTINE ZTABLE(2,FREQ,NZT)		MCARLO	
DIMENSION ZCUM(385)		MCARLO	
DATA (ZCUM(I),I=1,108)		MCARLO	
1	0000.0040.0080.0120.0160.0199.0239.0279.0319.0359.0399.0438.0478.0517.0557.0596.0636.0675.0714.0753.0793.0832.0871.0910.0948.0987.1026.1064.1103.1141.1179.1217.1255.1293.1331.1368.1406.1443.1480.1517.1554.1591.1628.1664.1700.1736.1772.1808.1844.1879.1915.1950.1985.2019.2054.2088.2123.2157.2190.2224.2257.2291.2324.2357.2393.2422.2452.2486.2517.2549.2580.2611.2642.2673.2704.2734.2764.2794.2823.2851.2881.2910.2939.2967.2995.3023.3051.3078.3106.3133.3159.3186.3212.3238.3264.3289.3315.3340.3365.3389.3413.3438.3461.3485.3508.3531.3554.3577.3599.3621.3643.3665.3686.3708.3729.3749.3770.3790.3812.3830.3849.3869.3887.3907.3925.3944.3962.3980.3997.4015.4032.4049.4066.4082.4099.4115.4131.4147.4162.4177.4192.4207.4222.4236.4251.4265.4279.4292.4306.4319.4332.4345.4357.4370.4382.4394.4406.4418.4429.4441.4452.4463.4474.4483.4493.4505.4515.4525.4535.4545.4554.4564.4573.4582.4591.4599.4608.4616.4625.4633.4641.4649.4656.4664.4671.4678.4686.4693.4699.4706.4712.4719.4726.4732.4738.4744.4750.4756.4761.4767.4772.4778.4783.4789.4793.4798.4803.4808.4812.4817.4821.4826.4830.4834.4838.4842.4846.4851.4854.4857.4861.4864.4868.4871.4875.4878.4881.4884.4887.4890.4893.4896.4898.4901.4904.4905.4908.4911.4913.4915.4918.4920.4922.4925.4927.4929.4931.4933.4934.4936.4938.4940.4941.4943.4945.4946.4948.4949.4951.4952.4953.4955.4956.4957.4959.4960.4961.4962.4963.4964.4965.4966.4967.4968.4969.4970.4971.4972.4973.4974.4975.4976.4977.4978.4979.4980.4981.4982.4983.4984.4985.4986.4987.4988.4989.4990.4991.4992.4993.4994.4995.4996.4997.4998.4999.5000.5001.5002.5003.5004.5005.5006.5007.5008.5009.5010.5011.5012.5013.5014.5015.5016.5017.5018.5019.5020.5021.5022.5023.5024.5025.5026.5027.5028.5029.5030.5031.5032.5033.5034.5035.5036.5037.5038.5039.5040.5041.5042.5043.5044.5045.5046.5047.5048.5049.5050.5051.5052.5053.5054.5055.5056.5057.5058.5059.5060.5061.5062.5063.5064.5065.5066.5067.5068.5069.5070.5071.5072.5073.5074.5075.5076.5077.5078.5079.5080.5081.5082.5083.5084.5085.5086.5087.5088.5089.5090.5091.5092.5093.5094.5095.5096.5097.5098.5099.5100.5101.5102.5103.5104.5105.5106.5107.5108.5109.5110.5111.5112.5113.5114.5115.5116.5117.5118.5119.5120.5121.5122.5123.5124.5125.5126.5127.5128.5129.5130.5131.5132.5133.5134.5135.5136.5137.5138.5139.5140.5141.5142.5143.5144.5145.5146.5147.5148.5149.5150.5151.5152.5153.5154.5155.5156.5157.5158.5159.5160.5161.5162.5163.5164.5165.5166.5167.5168.5169.5170.5171.5172.5173.5174.5175.5176.5177.5178.5179.5180.5181.5182.5183.5184.5185.5186.5187.5188.5189.5190.5191.5192.5193.5194.5195.5196.5197.5198.5199.5200.5201.5202.5203.5204.5205.5206.5207.5208.5209.5210.5211.5212.5213.5214.5215.5216.5217.5218.5219.5220.5221.5222.5223.5224.5225.5226.5227.5228.5229.5230.5231.5232.5233.5234.5235.5236.5237.5238.5239.5240.5241.5242.5243.5244.5245.5246.5247.5248.5249.5250.5251.5252.5253.5254.5255.5256.5257.5258.5259.5260.5261.5262.5263.5264.5265.5266.5267.5268.5269.5270.5271.5272.5273.5274.5275.5276.5277.5278.5279.5280.5281.5282.5283.5284.5285.5286.5287.5288.5289.5290.5291.5292.5293.5294.5295.5296.5297.5298.5299.5300.5301.5302.5303.5304.5305.5306.5307.5308.5309.5310.5311.5312.5313.5314.5315.5316.5317.5318.5319.5320.5321.5322.5323.5324.5325.5326.5327.5328.5329.5330.5331.5332.5333.5334.5335.5336.5337.5338.5339.5340.5341.5342.5343.5344.5345.5346.5347.5348.5349.5350.5351.5352.5353.5354.5355.5356.5357.5358.5359.5360.5361.5362.5363.5364.5365.5366.5367.5368.5369.5370.5371.5372.5373.5374.5375.5376.5377.5378.5379.5380.5381.5382.5383.5384.5385.5386.5387.5388.5389.5390.5391.5392.5393.5394.5395.5396.5397.5398.5399.5400.5401.5402.5403.5404.5405.5406.5407.5408.5409.5410.5411.5412.5413.5414.5415.5416.5417.5418.5419.5420.5421.5422.5423.5424.5425.5426.5427.5428.5429.5430.5431.5432.5433.5434.5435.5436.5437.5438.5439.5440.5441.5442.5443.5444.5445.5446.5447.5448.5449.5450.5451.5452.5453.5454.5455.5456.5457.5458.5459.5460.5461.5462.5463.5464.5465.5466.5467.5468.5469.5470.5471.5472.5473.5474.5475.5476.5477.5478.5479.5480.5481.5482.5483.5484.5485.5486.5487.5488.5489.5490.5491.5492.5493.5494.5495.5496.5497.5498.5499.5500.5501.5502.5503.5504.5505.5506.5507.5508.5509.5510.5511.5512.5513.5514.5515.5516.5517.5518.5519.5520.5521.5522.5523.5524.5525.5526.5527.5528.5529.5530.5531.5532.5533.5534.5535.5536.5537.5538.5539.5540.5541.5542.5543.5544.5545.5546.5547.5548.5549.5550.5551.5552.5553.5554.5555.5556.5557.5558.5559.5560.5561.5562.5563.5564.5565.5566.5567.5568.5569.5570.5571.5572.5573.5574.5575.5576.5577.5578.5579.5580.5581.5582.5583.5584.5585.5586.5587.5588.5589.5590.5591.5592.5593.5594.5595.5596.5597.5598.5599.5600.5601.5602.5603.5604.5605.5606.5607.5608.5609.5610.5611.5612.5613.5614.5615.5616.5617.5618.5619.5620.5621.5622.5623.5624.5625.5626.5627.5628.5629.5630.5631.5632.5633.5634.5635.5636.5637.5638.5639.5640.5641.5642.5643.5644.5645.5646.5647.5648.5649.5650.5651.5652.5653.5654.5655.5656.5657.5658.5659.5660.5661.5662.5663.5664.5665.5666.5667.5668.5669.5670.5671.5672.5673.5674.5675.5676.5677.5678.5679.5680.5681.5682.5683.5684.5685.5686.5687.5688.5689.5690.5691.5692.5693.5694.5695.5696.5697.5698.5699.5700.5701.5702.5703.5704.5705.5706.5707.5708.5709.5710.5711.5712.5713.5714.5715.5716.5717.5718.5719.5720.5721.5722.5723.5724.5725.5726.5727.5728.5729.5730.5731.5732.5733.5734.5735.5736.5737.5738.5739.5740.5741.5742.5743.5744.5745.5746.5747.5748.5749.5750.5751.5752.5753.5754.5755.5756.5757.5758.5759.5760.5761.5762.5763.5764.5765.5766.5767.5768.5769.5770.5771.5772.5773.5774.5775.5776.5777.5778.5779.5780.5781.5782.5783.5784.5785.5786.5787.5788.5789.5790.5791.5792.5793.5794.5795.5796.5797.5798.5799.5800.5801.5802.5803.5804.5805.5806.5807.5808.5809.5810.5811.5812.5813.5814.5815.5816.5817.5818.5819.5820.5821.5822.5823.5824.5825.5826.5827.5828.5829.5830.5831.5832.5833.5834.5835.5836.5837.5838.5839.5840.5841.5842.5843.5844.5845.5846.5847.5848.5849.5850.5851.5852.5853.5854.5855.5856.5857.5858.5859.5860.5861.5862.5863.5864.5865.5866.5867.5868.5869.5870.5871.5872.5873.5874.5875.5876.5877.5878.5879.5880.5881.5882.5883.5884.5885.5886.5887.5888.5889.5890.5891.5892.5893.5894.5895.5896.5897.5898.5899.5900.5901.5902.5903.5904.5905.5906.5907.5908.5909.5910.5911.5912.5913.5914.5915.5916.5917.5918.5919.5920.5921.5922.5923.5924.5925.5926.5927.5928.5929.5930.5931.5932.5933.5934.5935.5936.5937.5938.5939.5940.5941.5942.5943.5944.5945.5946.5947.5948.5949.5950.5951.5952.5953.5954.5955.5956.5957.5958.5959.5960.5961.5962.5963.5964.5965.5966.5967.5968.5969.5970.5971.5972.5973.5974.5975.5976.5977.5978.5979.5980.5981.5982.5983.5984.5985.5986.5987.5988.5989.5990.5991.5992.5993.5994.5995.5996.5997.5998.5999.6000.6001.6002.6003.6004.6005.6006.6007.6008.6009.6010.6011.6012.6013.6014.6015.6016.6017.6018.6019.6020.6021.6022.6023.6024.6025.6026.6027.6028.6029.6030.6031.6032.6033.6034.6035.6036.6037.6038.6039.6040.6041.6042.6043.6044.6045.6046.6047.6048.6049.6050.6051.6052.6053.6054.6055.6056.6057.6058.6059.6060.6061.6062.6063.6064.6065.6066.6067.6068.6069.6070.6071.6072.6073.6074.6075.6076.6077.6078.6079.6080.6081.6082.6083.6084.6085.6086.6087.6088.6089.6090.6091.6092.6093.6094.6095.6096.6097.6098.6099.6100.6101.6102.6103.6104.6105.6106.6107.6108.6109.6110.6111.6112.6113.6114.6115.6116.6117.6118.6119.6120.6121.6122.6123.6124.6125.6126.6127.6128.6129.6130.6131.6132.6133.6134.6135.6136.6137.6138.6139.6140.6141.6142.6143.6144.6145.6146.6147.6148.6149.6150.6151.6152.6153.6154.6155.6156.6157.6158.6159.6160.6161.6162.6163.6164.6165.6166.6167.6168.6169.6170.6171.6172.6173.6174.6175.6176.6177.6178.6179.6180.6181.6182.6183.6184.6185.6186.6187.6188.6189.6190.6191.6192.6193.6194.6195.6196.6197.6198.6199.6200.6201.6202.6203.6204.6205.6206.6207.6208.6209.6210.6211.6212.6213.6214.6215.6216.6217.6218.6219.6220.6221.6222.6223.6224.6225.6226.6227.6228.6229.6230.6231.6232.6233.6234.6235.6236.6237.6238.6239.6240.6241.6242.6243.6244.6245.6246.6247.6248.6249.6250.6251.6252.6253.6254.6255.6256.6257.6258.6259.6260.6261.6262.6263.6264.6265.6266.6267.6268.6269.6270.6271.6272.6273.6274.6275.6276.6277.6278.6279.6280.6281.6282.6283.6284.6285.6286.6287.6288.6289.6290.6291.6292.6293.6294.6295.6296.6297.6298.6299.6300.6301.6302.6303.6304.6305.6306.6307.6308.6309.6310.6311.6312.6313.6314.6315.6316.6317.6318.6319.6320.6321.6322.6323.6324.6325.6326.6327.6328.6329.6330.6331.6332.6333.6334.6335.6336.6337.6338.6339.6340.6341.6342.6343.6344.6345.6346.6347.6348.6349.6350.6351.6352.6353.6354.6355.6356.6357.6358.6359.6360.6361.6362.6363.6364.6365.6366.6367.6368.6369.6370.6371.6372.6373.6374.6375.6376.6377.6378.6379.6380.6381.6382.6383.6384.6385.6386.6387.6388.6389.6390.6391.6392.6393.6394.6395.6396.6397.6398.6399.6400.6401.6402.6403.6404.6405.6406.6407.6408.6409.6410.6411.6412.6413.6414.6415.6416.6417.6418.6419.6420.6421.6422.6423.6424.6425.6426.6427.6428.6429.6430.6431.6432.6433.6434.6435.6436.6437.6438.6439.6440.6441.6442.6443.6444.6445.6446.6447.6448.6449.6450.6451.6452.6453.6454.6455.6456.6457.6458.6459.6460.6461.6462.6463.6464.6465.6466.6467.6468.6469.6470.6471.6472.6473.6474.6475.6476.6477.6478.6479.6480.6481.6482.6483.6484.6485.6486.6487.6488.6489.6490.6491.6492.6493.6494.6495.6496.6497.6498.6499.6500.6501.6502.6503.6504.6505.6506.6507.6508.6509.6510.6511.6512.6513.6514.6515.6516.6517.6518.6519.6520.6521.6522.6523.6524.6525.6526.6527.6528.6529.6530.6531.6532.6533.6534.6535.6536.6537.6538.6539.6540.6541.6542.6543.6544.6545.6546.6547.6548.6549.6550.6551.6552.6553.6554.6555.6556.6557.6558.6559.6560.6561.6562.6563.6564.6565.6566.6567.6568.6569.6570.6571.6572.6573.6574.6575.6576.6577.6578.6579.6580.6581.6582.6583.6584.6585.6586.6587.6588.6589.6590.6591.6592.6593.6594.6595.6596.6597.6598.6599.6600.6601.6602.6603.6604.6605.6606.6607.6608.6609.6610.6611.6612.6613.6614.6615.6616.6617.6618.6619.6620.6621.6622.6623.6624.6625.6626.6627.6628.6629.6630.6631.6632.6633.6634.6635.6636.6637.6638.6639.6640.6641.6642.6643.6644.6645.6646.6647.6648.6649.6650.6651.6652.6653.6654.6655.6656.6657.6658.6659.6660.6661.6662.6663.6664.6665.6666.6667.6668.6669.6670.6671.6672.6673.6674.6675.6676.6677.6678.6679.6680.6681.6682.6683.6684.6685.6686.6687.6688.6689.6690.6691.6692.6693.6694.6695.6696.6697.6698.6699.6700.6701.6702.6703.6704.6705.6706.6707.6708.6709.6710.6711.6712.6713.6714.6715.6716.6717.6718.6719.6720.6721.6722.6723.6724.6725.6726.6727.6728.6729.6730.6731.6732.6733.6734.6735.6736.6737.6738.6739.6740.6741.6742.6743.6744.6745.6746.6747.6748.6749.6750.6751.6752.6753.6754.6755.6756.6757.6758.6759.6760.6761.6762.6763.6764.6765.6766.6767.6768.6769.6770.6771.6772.6773.6774.6775.6776.6777.6778.6779.6780.6781.6782.6783.6784.6785.6786.6787.6788.6789.6790.6791.6792.6793.6794.6795.6796.6797.6798.6799.6800.6801.6802.6803.6804.6805.6806.6807.6808.6809.6810.6811.6812.6813.6814.6815.6816.6817.6818.6819.6820.6821.6822.6823.6824.6825.6826.6827.6828.6829.6830.6831.6832.6833.6834.6835.6836.6837.6838.6839.6840.6841.6842.6843.6844.6845.6846.6847.6848.6849.6850.6851.6852.6853.6854.6855.6856.6857.6858.6859.6860.6861.6862.6863.6864.6865.6866.6867.6868.6869.6870.6871.6872.6873.6874.6875.6876.6877.6878.6879.6880.6881.6882.6883.6884.6885.6886.6887.6888.6889.6890.6891.6892.6893.6894.6895.6896.6897.6898.6899.6900.6901.6902.6903.6904.6905.6906.6907.6908.6909.6910.6911.6912.6913.6914.6915.6916.6917.6918.6919.6920.6921.6922.6923.6924.6925.6926.6927.6928.6929.6930.6931.6932.6933.6934.6935.6936.6937.6938.6939.6940.6941.6942.6943.6944.6945.6946.6947.6948.6949.6950.6951.6952.6953.6954.6955.6956.6957.6958.6959.6960.6961.6962.6963.6964.6965.6966.6967.6968.6969.6970.6971.6972.6973.6974.6975.6976.6977.6978.6979.6980.6981.6982.6983.6984.6985.6986.6987.6988.6989.6990.6991.6992.6993.6994.6995.6996.6997.6998.6999.7000.7001.7002.7003.7004.7005.7006.7007.7008.7009.7010.7011.7012.7013.7014.7015.7016.7017.7018.7019.7020.7021.7022.7023.7024.7025.7026.7027.7028.7029.7030.7031.7032.7033.7034.7035.7036.7037.7038.7039.7040.7041.7042.7043.7044.7045.7046.7047.7048.7049.7050.7051.7052.7053.7054.7055.7056.7057.7058.7059.7060.7061.7062.7063.7064.7065.7066.7067.7068.7069.7070.7071.7072.7073.7074.7075.7076.7077.7078.7079.7080.7081.7082.7083.7084.7085.7086.7087.7088.7089.7090.7091.7092.7093.7094.7095.7096.7097.7098.7099.7100.7101.7102.7103.7104.7105.7106.7107.710		

FREQ = ZCUM121/10000.		MCARLO	719
IF12=C.1105.105.106		MCARLO	720
60	105 FREQ=0.5-FREQ	MCARLO	721
	GO TO 200	MCARLO	722
	106 FREQ=FREQ+0.5	MCARLO	723
	200 RETURN	MCARLO	724
	END	MCARLO	725

SYMBOLIC REFERENCE MAP (3=3)

ENTRY POINTS	DCF LINE	REFERENCES
3 ZTABLE	1	63

VARIABLES	SN	TYPE	RELOCATION
55 ABSZ	REAL	REFS	48
56 EPSLN1	REAL	REFS	44
57 EPSLN2	REAL	REFS	45
0 FREQ	REAL	REFS	60
60 IZ	INTEGER	REFS	50
0 NZT	INTEGER	REFS	53
61 RZ	REAL	REFS	51
0 Z	REAL	REFS	41
62 ZCUM	REAL	REFS	2

INLINE FUNCTIONS	TYPE	ARGS	DEF LINE	REFERENCES
ABS	REAL	1	INTRIN	41

STATEMENT LABELS	DEF LINE	REFERENCES
26 101	54	2*52
0 102	57	52
33 103	55	51
0 104	55	2*54
0 105	60	2*59
43 106	62	53
0 107	41	
16 110	48	45
0 111	45	2*44
0 112	46	2*55
46 200	63	47
		56
		51

STATISTICS	PROGRAM LENGTH
	6630
	435


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2 CONTINUE
  NS=NS+1
  SORTY(NS)=Y(IY)
  Y(IY)=Y(MD)
  SORTX(NS)=X(IY)
  X(IY)=X(MD)
  MD=MD-1
  IF(MD.GT.1) GO TO 103
  NS=NS+1
  SORTY(NS)=Y(1)
  SORTX(NS)=X(1)
  XHAXA = A35(XH)
  XHINA=ABS(XHIN)
  XDEVH=AMAX1(XHAXA,XHINA)
  YHAXA=ABS(SORTY(1))
  YHINA=ABS(SORTY(NP))
  YDEVH=AMAX1(YHAXA,YHINA)
  YCIR=ABS(XBAR) + AMAX1(CEP,RCONE)
  YCIR=ABS(XBAR) + AMAX1(CEP,RCONE)
  TSPRD=AMAX1(XDEVH,YDEVH,XCIS,YCIR)
  IF(PSIZE.GT.0) TSPRD=PSIZE/2.
  SCAL=TSPRD/21.
  SCAL2=SCAL/2.
  HSPRD=TSPRD
  HSCAL=TSPRD/35.
  GCIRP=YBAR + CEP
  GCIRBT=YBAR - CEP
  RCIRP=YBAR + RCONE
  RCIRBT=YBAR - RCONE
  IF(RCONE.LT.CEP) RCIRP=100000.
  YCEP = GCIRP + SCAL
  YRCNF = GCIRP + SCAL
  ICSM = 0
  TU = TSPRD + SCAL
  NJ=1
  CALL X'OCIO',HSPRD,IND,INDX)
  IXMD=IND
  IXNDX = INDX
  DO 15 I=1,44
    TU=TU - SCAL
    PLINE(IXMD)= RC1.A.MSKK(IXNDX).O.PLINE(IXMD).A..M.MSKK(IXNDX)
    IF(0..LT.TU.OX.I7G1S4.GT.0) GO TO 2222
    DO 2223 IOP=7,16
      2223 PLINE(IOP)=RC3
      2222 CONTINUE
    IF(CICIRP.LT.TU.OX.TU.LT.CCIR3T) GO TO 3100
    YCEP=YCEP - SCAL
    ARG=CEP**2 - YCEP**2 + 2*YCEP*YBAR - YBAR**2
    IF(IAKGG.LT.0) GO TO 3100
    RAD=SQRT(IAKGG)
    GO TO 5101
  5100 CONTINUE
  IF(CICIRP.LT.TU) GO TO 205
  IF(ABS(TU - CCIR3T).GT.SCAL2) GO TO 205
  RAD=0.
  5101 CONTINUE
  XYL=XBAR - RAD

```


SYMBOLIC REFERENCE MAP (R=3)									
ENTRY POINTS	DEF LINE	REFERENCES							
2 PLOT	1	168							
VARIABLES			SM	TYPE	RELOCATION				
722 ARGG	REAL	REFS	106	107	DEFINED	105			
726 ARGMF	REAL	REFS	123	124	DEFINED	122			
477 BLNKK	REAL	REFS	31	34	158	DEFINED	15		
707 CCI8BT	REAL	REFS	103	111	DEFINED	84			
766 CCI8TP	REAL	REFS	88	103	110	DEFINED	83		
8 CEP	REAL	REFS	22	75	76	87			
		162	DEFINED	1					
467 GEPK	REAL	REFS	30	DEFINED	6				
470 COMFC	REAL	REFS	41	DEFINED	7				
662 GPCCG	REAL	REFS	32	35	DEFINED	31	34		
476 CPDEN	REAL	REFS	31	141	DEFINED	14			
473 CPR	REAL	REFS	116	119	DEFINED	11			
732 DX	REAL	REFS	152	DEFINED	151				
471 EPSLN	* REAL	DEFINED	8						
705 MSCAL	* REAL	DEFINED	92						
704 MSPRD	REAL	REFS	82	93	115	118	132	135	148
		144	151	DEFINED	81				
661 I	INTEGER	REFS	26	52	53	54	2*54	2*57	
		DEFINED	26	43	51	96			
		REFS	40	41	155	DEFINED	1		
8 ICHL	INTEGER	DEFINED	20						
655 ICI8SM	* INTEGER	REFS	137	DEFINED	90	139			
712 ICSM	INTEGER	REFS	33	95	115	2*116	118	2*119	132
716 INDX	INTEGER	REFS	2*133	135	2*136	140	2*141	144	151
		2*152							
721 IOP	INTEGER	REFS	191	DEFINED	100				
656 IIGTSM	INTEGER	REFS	39	142	DEFINED	21	143		
715 IMP	INTEGER	REFS	93	94	115	2*116	118	2*119	132
		2*133	135	2*136	140	2*141	144	2*145	151
		2*152							
720 IAXDX	INTEGER	REFS	2*98	DEFINED	95				
737 IAND	INTEGER	REFS	2*98	DEFINED	94				
670 LV	INTEGER	REFS	50	51	52	63	DEFINED	54	
727 JQ	INTEGER	REFS	150	154	DEFINED	146	150		
730 K	INTEGER	REFS	149	151	DEFINED	148			
731 KUG	INTEGER	REFS	155	158	DEFINED	155	157		
1271 MSKK	INTEGER	REFS	4	2*31	2*34	2*98	2*115	2*119	2*133
		2*136	2*141	2*145	2*152	DEFINED	16		
		REFS	51	55	51	63	54	55	
663 ND	INTEGER	DEFINED	66	64					
714 NJ	INTEGER	REFS	147	148	154	DEFINED	92	134	
8 NP	INTEGER	REFS	46	55	73	147	148		
		DEFINED	1						
664 NS	INTEGER	REFS	59	60	52	66	57	58	
		DEFINED	47	59	56				
1243 PLINE	REAL	REFS	3	98	116	119	133	136	141
		REFS	145	152	155	DEFINED	9	98	110
		119	133	136	141	145	152	158	
466 POINTS	REAL	REFS	29	DEFINED	5				
472 PP	REAL	REFS	132	DEFINED	10				
8 PSIZE	REAL	REFS	2*78	DEFINED	1				
		REFS	2*78	DEFINED	1				

VARIABLES	SN	TYPE	RELOCATION	REFS	114	117	131	134	DEFINED	107	112
723 RAD	REAL			REFS	114	117	131	134	DEFINED	107	112
711 RCIRBT	REAL			REFS	129	120	DEFINED	66	DEFINED	86	112
710 RCIRTP	REAL			REFS	120	120	127	DEFINED	55	57	97
0 RCONF	REAL		F.P.	REFS	59	75	76	85	86	87	123
474 RCR	REAL			REFS	165	1	133	136	DEFINED	12	121
702 SCAL	REAL			REFS	98	101	89	91	97	104	121
703 SCAL2	REAL			REFS	79	120	DEFINED	80	DEFINED	80	121
1077 SORTX	REAL		ARRAY	REFS	111	120	DEFINED	80	DEFINED	80	121
733 SORTY	REAL		ARRAY	REFS	3	151	DEFINED	62	DEFINED	58	67
711 TGT	REAL			REFS	3	72	73	149	DEFINED	59	67
701 TSPRO	REAL		ARRAY	REFS	34	145	DEFINED	13	DEFINED	13	13
713 TU	REAL			REFS	79	81	91	DEFINED	1	77	70
0 X	REAL		F.P.	REFS	97	99	2*103	110	111	2*120	122
0 XBAR	REAL		F.P.	REFS	138	142	149	DEFINED	91	97	97
677 XCIR	REAL			REFS	1	2*56	2*57	62	63	68	68
673 XDEVH	REAL			REFS	75	63	114	117	134	140	161
0 XLABD	REAL		F.P.	REFS	162	1	DEFINED	1	DEFINED	75	77
666 XMAX	REAL			REFS	77	DEFINED	71	DEFINED	1	DEFINED	71
671 XMAXA	REAL			REFS	26	59	DEFINED	49	56	56	56
655 XMIN	REAL			REFS	71	70	DEFINED	48	57	57	57
672 XMINA	REAL			REFS	71	DEFINED	70	DEFINED	114	131	131
724 XKL	REAL			REFS	115	132	DEFINED	117	134	134	134
725 XXU	REAL			REFS	118	135	DEFINED	60	61	67	67
0 Y	REAL		F.P.	REFS	3	52	53	60	61	67	67
6 YBAR	REAL		F.P.	REFS	1	51	84	85	86	2*105	2*122
657 YCEP	REAL			REFS	138	151	DEFINED	1	DEFINED	22	184
700 YCIR	REAL			REFS	104	2*105	DEFINED	22	58	184	184
676 YDEVH	REAL			REFS	77	DEFINED	76	DEFINED	76	76	76
667 YMAX	REAL			REFS	77	DEFINED	74	DEFINED	74	74	74
674 YMAXA	REAL			REFS	52	DEFINED	50	53	53	53	53
675 YMINA	REAL			REFS	74	DEFINED	72	DEFINED	72	72	72
660 YCONF	REAL			REFS	74	DEFINED	73	DEFINED	73	73	73
660 YCONF	REAL			REFS	121	2*122	DEFINED	23	89	121	121

FILE NAMES	MODE	WRITES	24	26	28	29	30	32	35	41
TAPE6	FMT	44	155	150	162	165	30	32	35	41

EXTERNALS	TYPE	ARGS	REFERENCES	124	151
SQRI	REAL	1 LIBARY	107	124	151
XLOC	REAL	4	93	115	118

INLINE FUNCTIONS	TYPE	ARGS	DEF LINE	REFERENCES	70	72	73	75	76	111	120
ABS	REAL	1 INTRIN	69	70	74	75	76	77	76	111	120
AMAX1	REAL	0 INTRIN	71	74	75	76	77	77	76	111	120

STATEMENT LABELS	DEF LINE	REFERENCES	0	1	43	51	55
0	1	43	51	55	55	55	55
102	2	51	55	55	55	55	55

STATEMENT LABELS	DEF LINE	REFERENCES
0 15	159	95
0 16	133	143
0 33	158	157
41 100	42	68
74 101	55	52
36 183	30	63
0 186	INACTIVE	75
0 110	INACTIVE	77
416 201	134	143
420 202	155	147
300 205	128	111
345 207	137	127 128
361 210	142	137 138
373 213	145	142
503 1008	FMT	25
512 1001	FMT	27
547 1002	FMT	37
552 1003	FMT	23 23 358
617 1021	FMT	163
602 1022	FMT	156
554 1072	FMT	39
570 1073	FMT	31
636 1175	FMT	165
534 1492	FMT	32
544 1493	FMT	36
233 2222	FMT	182
0 2223		101
251 5189		109
260 5161		113
316 5190		126
325 5191		138

LOOPS LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES
42 1	I	43 44	58	EXT REFS
70 2	I	51 58	153	OPI
217 15	I	96 159	218	EXT REFS NOT-INNER
231 2223	IOP	100 101	28	INSTACK
400 16	K	148 153	168	EXT REFS
424 33	KUG	157 158	23	INSTACK

STATISTICS	
PROGRAM LENGTH	13153 717

SUBROUTINE XLOC		74/74	OPT=1	FTM 4.2+75057	85/15/75	16.17.86	PAGE 1
SUBROUTINE XLOC(XVAL, HSPRO, IND, INDX)							
XD=ABS(-HSPRO - XVAL)							
XR=XD/12.*HSPRO							
RK=XR*70.							
KK=RK							
RKK=KK							
RMDR=RK-RKK							
IF(RMDR.GE.J-51.KK)KK+1							
KK1=KK - 1							
IND=KK1/7							
INDX=KK - 7*IND							
IND=INDX + 7							
RETURN							
END							
MCARLO 895							
MCARLO 896							
MCARLO 897							
MCARLO 898							
MCARLO 899							
MCARLO 900							
MCARLO 901							
MCARLO 902							
MCARLO 903							
MCARLO 904							
MCARLO 905							
MCARLO 906							
MCARLO 907							
MCARLO 908							

SUBROUTINE XLOC		74/74	OPT=1	FTM 4.2+75057	85/15/75	16.17.86	PAGE 2
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SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS		DEF LINE	REFERENCES	3-XLOC		1	13
VARIABLES		SM	TYPE	RELOCATION			
0	HSPRO		REAL		F.P.	2	
0	INDX		INTEGER		F.P.	11	
0	IND		INTEGER		F.P.	11	
37	KK		INTEGER			12	DEFINED
42	KK1		INTEGER			6	9
36	RK		REAL			10	DEFINED
40	RKK		REAL			5	DEFINED
41	RMDR		REAL			7	DEFINED
34	XD		REAL			8	DEFINED
35	XR		REAL			3	DEFINED
0	XVA		REAL		F.P.	4	DEFINED
						2	DEFINED
							1
INLINE FUNCTIONS				TYPE	ARCS	DEF LINE REFERENCES	
ABS	REAL	1	INTRIN				

STATISTICS

PROGRAM LENGTH	433	35
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SUBROUTINE 62
C 88 MONTE CARLO WINDS 88
COMMON C(3838)
EQUIVALENCE (C(3753), ITNDX)
EQUIVALENCE (C(3721), ITCT)
EQUIVALENCE (C( 52), VTEI)
EQUIVALENCE (C( 54), SIGU)
EQUIVALENCE (C( 56), BLU)
EQUIVALENCE (C( 58), WNDW)
EQUIVALENCE (C( 59), SLWD)
EQUIVALENCE (C( 60), SLW)
EQUIVALENCE (C( 62), SLW)
EQUIVALENCE (C( 63), CBPSIM)
EQUIVALENCE (C( 65), CBPSIM)
EQUIVALENCE (C( 69), GSIGU)
EQUIVALENCE (C( 70), GVTEI)
EQUIVALENCE (C( 100), VHXE)
EQUIVALENCE (C( 101), VHYE)
EQUIVALENCE (C( 102), VHXE)
EQUIVALENCE (C(1503), VXE)
EQUIVALENCE (C(1507), VTEI)
EQUIVALENCE (C(1511), VZEI)
DIMENSION ITNDX(18)
DATA ENSTRT /3./
ICK = 0
DO 500 IOL = 1, ITCT
ITSNDX = IOL
C
C MONTE CARLO WIND GUSTS TIME SERIES
IF (ITNDX(IOL).NE.70) GO TO 502
UBAR = 0.
IF (VME.NE.3.) UBAR = ABS((VME*VME + VYE*VYE + VZE*VZE)/VME)
CALL MCARLO(UM, 2, ITSNDX)
WMD402 = JB42/BL + ANOM
GLM = GSIGU*SQRT(WMD402)
SLW = SLW - WMD402*SLW
GVME = VME + U.W*SLW
ICK = 1
502 CONTINUE
504 CONTINUE
IF (ICK.EQ.0) GO TO 503
VME = -GVME*CBPSIM
VYE = -GVME*CBPSI4
503 CONTINUE
C
RETURN
END

```


SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES	VARIABLES	SN	TYPE	RELOCATION	1	2	3	4	5	6	7	8	9																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
1-62	1	46	67 BLU	0	C	REAL	ARRAY	11	10	18	33	37	41	27	5	4	33	11	24	14	7	12	10	34	36	17	18	19	20	21	22	25	26	27	30	35	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000

EXTERNALS	TYPE	ARGS	REFERENCES
MCARLO		3	33
SORT	REAL	1	LIBRARY
			75

INLINE FUNCTIONS	TYPE	ARGS	DEF LINE	REFERENCES
ABS	REAL	1	INTRIN	32

STATEMENT LABELS	REF LINE	REFERENCES
0 500	40	25
36 502	39	
45 503	45	41

LOOPS--LABEL--		INDEX	FROM-TO	LENGTH	PROPERTIES	EXT REFS
4	500	" 10L	26 40	35B		

COMMON BLOCKS		LENGTH	MEMBERS	- BIAS NAME (LENGTH)
1	1	243C	1	A C (243D)

SUBROUTINE G2		74274	OPIN1	PTN 4-2-73067	6570575	16-17-85	PAGE 3
EQUIV CLASSES	LENGTH	MEMBERS - BIAS NAME (LENGTH)					
C	3830	51 VME (1)	53 SIGU (1)	55 BLU (1)			
		57 MHDQ (1)	58 SLMD (1)	59 RLM (1)			
		61 S-M (1)	64 CBPSIM (1)	65 SBPSIM (1)			
		68 GSIGU (1)	69 GVME (1)	99 VMXE (1)			
		100 VME (1)	101 VMZE (1)	1602 VXE (1)			
		1506 VYE (1)	1613 VZE (1)	3720 ITCT (1)			
		3752 ITNDX (10)					
STATISTICS							
PROGRAM LENGTH	633	51					
CM BLANK COMMON LENGTH	73663	3830					

```

SUBROUTINE G21
  COMMON C(3850)
  C**INPUT DATA
    5 EQUIVALENCE(C(200),I)
      EQUIVALENCE(C( 50),OPTM)
      EQUIVALENCE(C( 51),BPSIM)
      EQUIVALENCE(C( 52),VMT)
  C**OUTPUT DATA
    10 EQUIVALENCE(C(100),VMT)
      EQUIVALENCE(C(101),VMT)
      EQUIVALENCE(C(102),VMT)
  C**INPUTS FROM OTHER MODULES
    15 EQUIVALENCE(C( 54),SIGU)
      EQUIVALENCE(C( 55),3LW)
      EQUIVALENCE(C( 56),MNWD)
      EQUIVALENCE(C( 59),SLM)
      EQUIVALENCE(C( 60),RLM)
      EQUIVALENCE(C( 62),SLM)
      EQUIVALENCE(C( 63),GBPSIM)
      EQUIVALENCE(C( 66),SBPSIM)
      EQUIVALENCE(C( 68),VMT)
      EQUIVALENCE(C( 69),GSIGU)
      EQUIVALENCE(C(256),IPL)
      EQUIVALENCE(C(256),ISNDX)
      EQUIVALENCE(C(3512),I3512)
      EQUIVALENCE(C(3753),ITNDX)
      EQUIVALENCE(C(3753),ITCT)
    20 DIMENSION IPL(100),ISNDX(100),ITNDX(100)
      VMT=VMT
      C MONTE CARLO STEADY STATE WIND COMPONENT
        DO 500 I=1,13512
          IDO = I
          IF(IISNDX(I).EQ.51) CALL MCARLO (DUM, 1, IDO)
          IF(IISNDX(I).EQ.52) CALL MCARLO (DUM, 1, IDO)
          500 CONTINUE
        C
          VMT = ABS(VMT)
          SLW = 0.
        C
          C MONTE CARLO INITIAL VALUE OF TIME SERIES WIND JUSTS
            DO 501 I=1,ITCT
              IDO = I
              IF(ITNDX(I).NE.70) GO TO 501
              CALL MCARLO (DUM,1,IDO)
              MNWD = 1.
              IF(VMT.EQ.0.) GO TO 505
              SIGU = VMT/2.9
              GO TO 506
            5 CONTINUE
              VMT = 2.9 * SIGU
            506 CONTINUE
              SIGU = SIGU*SQRT(1.89/G(2654))
              BLU = -12.1*SIGU + 475.
              IF(VMTEN/VMT.EQ.1) MNWD = VMT/VMTEN

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SUBROUTINE G21 7/4/74 OPT=1 FTN 4.2+75067 05/05/75 16-17-06 PAGE 2

```

      IPL(N) = 59
      N = N + 1
      501 CONTINUE
      C
      CBPSIN = COSD(BPSIN)
      SBPSIN = SIND(BPSIN)
      VNYE = - VNYE*CBPSIN
      VNYE = - VNYE*SBPSIN
      VNYE = 0.
      RETURN
      END
    
```

G2 106
G2 107
G2 108
G2 109
G2 110
G2 111
G2 112
G2 113
G2 114
G2 115
G2 116

SUBROUTINE G21 7/4/74 OPT=1 FTN 4.2+75067 05/05/75 16-17-06 PAGE 3

CARD NR. SEVENTH DETAILS DIAGNOSIS OF PROBLEM

50 1 IFGT THIS STATEMENT MAY REDEFINE A CURRENT LOOP CONTROL VARIABLE OR PARAMETER.

SUBROUTINE G21		24724	DP128	FTN 4-2+73067	05/05/75	16-17.86.	PAGE	5
COMMON BLOCKS		LENGTH	MEMBERS		BIAS NAME(LENGTH)			
//		383C			V C		(3830)	
EQUIV CLASSES		LENGTH	MEMBERS		BIAS NAME(LENGTH)			
C		3836						
			43 OPTN		(1)		50 BPSIM (1)	
			53 SLJ		(1)		55 BLJ (1)	
			53 SLO		(1)		59 RL4 (1)	
			64 CBPSIM		(1)		61 SLW (1)	
			68 GSIGU		(1)		65 SBPSIM (1)	
			101 V4ZE		(1)		67 VMTEM (1)	
			2561 IPL		(100)		100 VMYE (1)	
			3720 ITST		(1)		2560 N (1)	
							3633 ISNOX (40)	
STATISTICS								
PROGRAM LENGTH		1163		78				
CM BLANK COMMON LENGTH		73663		3830				

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SUBROUTINE GC      74724  DPE1      FTN 4,2+73857  05/05/75  16,17,86.  PAGE 4
      SUBROUTINE G3
      C**AIR DATA MODULE 33
      COMMON 33830
      C**INPUT DATA
      C**INPUTS FROM OTHER MODULES
      EQUIVALENCE (C1208),RHZRO )
      EQUIVALENCE (C10100),VHXE )
      EQUIVALENCE (C10101),VMYE )
      EQUIVALENCE (C10102),VMZE )
      EQUIVALENCE (C11503),VXE )
      EQUIVALENCE (C11607),VYE )
      EQUIVALENCE (C11611),VZE )
      EQUIVALENCE (C11623),RZE )
      C**INPUTS FROM MAIN PROGRAM
      C**STATE VARIABLE OUTPUTS
      C**NONE
      C**OTHER OUTPUTS
      EQUIVALENCE (C10200),VHXE )
      EQUIVALENCE (C10201),VMYE )
      EQUIVALENCE (C10202),VMZE )
      EQUIVALENCE (C10203),PDYNHC )
      EQUIVALENCE (C10204),VRACH )
      EQUIVALENCE (C10205),ORHC )
      EQUIVALENCE (C10206),VSOUND )
      EQUIVALENCE (C10207),VAIRSP )
      EQUIVALENCE (C10209),RH )
      C**CALCULATE PRESENT ALTITUDE
      RH = -RZE+RHZRO
      C**CALCULATE MISSILE VELOCITY, WRT AIR MASS IN EARTH AXES
      VHXE = VXE-VHXE
      VMYE = VYE-VMYE
      VMZE = VZE-VMZE
      VAIRSP = SQRTH(VHXE**2+VMYE**2+VMZE**2)
      C**AIR DENSITY, SPEED OF SOUND, DYNAMIC PRESSURE, AND MACH
      ORHC = (.0764751/(1.+3325E-04*RH+RH*RH*.02315E-12)
      VSOUND = -.00332*34+1117.3
      PDYNHC = (ORHC*VAIRSP*VAIRSP)/54.344
      YH*CH = VAIRSP/VSOUND
      RETURN
      END

```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES												
1 G3	1	39												
VARIABLES	SN	TYPE	REAL	RELOCATION	ARRAY	REFS	3	5	7	8	9	10	11	23
314 DRMO	REAL	12	13	25	26	37	19	20	35	36	37	38	39	40
312 POYNHC	REAL	24	25	26	37	19	20	35	36	37	38	39	40	41
320 RH	REAL	REFS	21	26	35	36	37	38	39	40	41	42	43	44
317 RHZRO	REAL	REFS	5	28	29	30	31	32	33	34	35	36	37	38
3126 RZE	REAL	REFS	13	28	29	30	31	32	33	34	35	36	37	38
316 VAIRSP	REAL	REFS	25	26	37	19	20	35	36	37	38	39	40	41
313 VHACH	REAL	REFS	22	23	24	25	26	27	28	29	30	31	32	33
307 VMXKE	REAL	REFS	18	19	20	21	22	23	24	25	26	27	28	29
310 VMXKE	REAL	REFS	19	20	21	22	23	24	25	26	27	28	29	30
311 VMXZE	REAL	REFS	20	21	22	23	24	25	26	27	28	29	30	31
315 VSOUND	REAL	REFS	24	25	26	27	28	29	30	31	32	33	34	35
315 VMXKE	REAL	REFS	7	8	9	10	11	12	13	14	15	16	17	18
144 VMXKE	REAL	REFS	8	9	10	11	12	13	14	15	16	17	18	19
145 VMXKE	REAL	REFS	9	10	11	12	13	14	15	16	17	18	19	20
3102 VXE	REAL	REFS	10	11	12	13	14	15	16	17	18	19	20	21
3166 VTE	REAL	REFS	11	12	13	14	15	16	17	18	19	20	21	22
3112 VZE	REAL	REFS	12	13	14	15	16	17	18	19	20	21	22	23

EXTERNALS TYPE ARCS REFERENCES
SQRT REAL 1 LIBRARY 33

COMMON BLOCKS LENGTH MEMBERS - BLAS NAME(LENGTH)
/ / 3830 0 (3830)

EQUIV-CLASSES LENGTH MEMBERS - BLAS NAME(LENGTH)
C C 3830 99 VMXKE (1) 100 VMXKE (1) 101 VMXKE (1)
199 VMXKE (1) 200 VMXKE (1) 201 VMXKE (1)
202 POYNHC (1) 203 VMXKE (1) 204 VMXKE (1)
205 VSOUND (1) 206 VAIRSP (1) 207 RHZRO (1)
208 RH (1) 1602 VXE (1) 1606 VXE (1)
1610 VZE (1) 1622 RZE (1)

STATISTICS
PROGRAM LENGTH 403 32
CM BLANK COMMON LENGTH 73663 3830

SUBROUTINE G5		C**COORDINATE CONVERSION MODULE		COMMON C(3830)	
C**INPUTS FROM OTHER MODULES		EQUIVALENCE C(1020),VMHXE)		G5 2	
		EQUIVALENCE C(1021),VMHZE)		G5 3	
		EQUIVALENCE C(1022),VMHZE)		G5 4	
		EQUIVALENCE C(1023),VMHZE)		G5 5	
		EQUIVALENCE C(1024),VAISP)		G5 6	
		EQUIVALENCE C(1131),RAIL)		G5 7	
		EQUIVALENCE C(1132),QURN)		G5 8	
		EQUIVALENCE C(1133),VXE)		G5 9	
		EQUIVALENCE C(1134),VYE)		G5 10	
		EQUIVALENCE C(1135),VZE)		G5 11	
		EQUIVALENCE C(1136),RXE)		G5 12	
		EQUIVALENCE C(1137),RYE)		G5 13	
		EQUIVALENCE C(1138),RZE)		G5 14	
		EQUIVALENCE C(1139),RDELX)		G5 15	
		EQUIVALENCE C(1140),RDELY)		G5 16	
		EQUIVALENCE C(1141),RDELZ)		G5 17	
		EQUIVALENCE C(1142),RTXE)		G5 18	
		EQUIVALENCE C(1143),RTYE)		G5 19	
		EQUIVALENCE C(1144),RTZE)		G5 20	
		EQUIVALENCE C(1145),RXO)		G5 21	
		EQUIVALENCE C(1146),RYO)		G5 22	
		EQUIVALENCE C(1147),RZO)		G5 23	
		EQUIVALENCE C(1148),VXO)		G5 24	
		EQUIVALENCE C(1149),VYO)		G5 25	
		EQUIVALENCE C(1150),VZO)		G5 26	
		EQUIVALENCE C(1151),RSJHNC)		G5 27	
		EQUIVALENCE C(1152),RSPJTX)		G5 28	
		EQUIVALENCE C(1153),RSPJTY)		G5 29	
		EQUIVALENCE C(1154),RSPJTZ)		G5 30	
		EQUIVALENCE C(1155),ITDX)		G5 31	
		EQUIVALENCE C(1156),ITCT)		G5 32	
		EQUIVALENCE C(1157),SXPD)		G5 33	
		EQUIVALENCE C(1158),SXPD)		G5 34	
		EQUIVALENCE C(1159),SXPD)		G5 35	
		EQUIVALENCE C(1160),SXPD)		G5 36	
		EQUIVALENCE C(1161),SXPD)		G5 37	
		EQUIVALENCE C(1162),SXPD)		G5 38	
		EQUIVALENCE C(1163),SXPD)		G5 39	
		EQUIVALENCE C(1164),SXPD)		G5 40	
		EQUIVALENCE C(1165),SXPD)		G5 41	
		EQUIVALENCE C(1166),SXPD)		G5 42	
		EQUIVALENCE C(1167),SXPD)		G5 43	
		EQUIVALENCE C(1168),SXPD)		G5 44	
		EQUIVALENCE C(1169),SXPD)		G5 45	
		EQUIVALENCE C(1170),SXPD)		G5 46	
		EQUIVALENCE C(1171),SXPD)		G5 47	
		EQUIVALENCE C(1172),ZETA)		G5 48	
		EQUIVALENCE C(1173),ZETA)		G5 49	
		DIMENSION ITDX(10)		G5 50	
		EQUIVALENCE C(1174),CFA11)		G5 51	
		EQUIVALENCE C(1175),CFA12)		G5 52	
		EQUIVALENCE C(1176),CFA13)		G5 53	
		EQUIVALENCE C(1177),CFA21)		G5 54	
		EQUIVALENCE C(1178),CFA22)		G5 55	
		EQUIVALENCE C(1179),CFA23)		G5 56	
		EQUIVALENCE C(1180),CFA31)		G5 57	
		EQUIVALENCE C(1181),CFA32)		G5 58	

60	EQUIVALENCE (C(1735),CFA33)	63	59
	EQUIVALENCE (C(1731),CRAO)	63	60
	EQUIVALENCE (C(1768),XB01)	63	61
	EQUIVALENCE (C(1753),YB01)	63	62
	EQUIVALENCE (C(1770),ZB01)	63	63
	EQUIVALENCE (C(1771),XB02)	63	64
65	EQUIVALENCE (C(1772),YB02)	63	65
	EQUIVALENCE (C(1773),ZB02)	63	66
	EQUIVALENCE (C(1764),XB03)	63	67
	EQUIVALENCE (C(1765),YB03)	63	68
	EQUIVALENCE (C(1755),ZB03)	63	69
70	EQUIVALENCE (C(1761),XB04)	63	70
	EQUIVALENCE (C(1751),YB04)	63	71
	EQUIVALENCE (C(1752),ZB04)	63	72
	EQUIVALENCE (C(1763),XB05)	63	73
	EQUIVALENCE (C(1753),YB05)	63	74
	EQUIVALENCE (C(1754),ZB05)	63	75
75	EQUIVALENCE (C(1756),XB06)	63	76
	EQUIVALENCE (C(1757),YB06)	63	77
	EQUIVALENCE (C(1758),ZB06)	63	78
	EQUIVALENCE (C(1759),XB07)	63	79
	EQUIVALENCE (C(1760),YB07)	63	80
80	EQUIVALENCE (C(2000),XB08)	63	81
	EQUIVALENCE (C(2001),YB08)	63	82
	EQUIVALENCE (C(2002),ZB08)	63	83
	EQUIVALENCE (C(2003),XB09)	63	84
	EQUIVALENCE (C(2004),YB09)	63	85
85	EQUIVALENCE (C(2005),ZB09)	63	86
	EQUIVALENCE (C(2006),XB10)	63	87
	EQUIVALENCE (C(2007),YB10)	63	88
	EQUIVALENCE (C(2008),ZB10)	63	89
90	EQUIVALENCE (C(2009),XB11)	63	90
	EQUIVALENCE (C(2010),YB11)	63	91
	EQUIVALENCE (C(2011),ZB11)	63	92
	EQUIVALENCE (C(2012),XB12)	63	93
	EQUIVALENCE (C(2013),YB12)	63	94
95	EQUIVALENCE (C(2014),ZB12)	63	95
	EQUIVALENCE (C(2015),XB13)	63	96
	EQUIVALENCE (C(2016),YB13)	63	97
	EQUIVALENCE (C(2017),ZB13)	63	98
	EQUIVALENCE (C(2018),XB14)	63	99
100	EQUIVALENCE (C(2019),YB14)	63	100
	EQUIVALENCE (C(2020),ZB14)	63	101
	EQUIVALENCE (C(2021),XB15)	63	102
	EQUIVALENCE (C(2022),YB15)	63	103
	EQUIVALENCE (C(2023),ZB15)	63	104
105	EQUIVALENCE (C(2024),XB16)	63	105
	EQUIVALENCE (C(2025),YB16)	63	106
	EQUIVALENCE (C(2026),ZB16)	63	107
	EQUIVALENCE (C(2027),XB17)	63	108
	EQUIVALENCE (C(2028),YB17)	63	109
110	EQUIVALENCE (C(2029),ZB17)	63	110
	EQUIVALENCE (C(2030),XB18)	63	111
	EQUIVALENCE (C(2031),YB18)	63	112
	EQUIVALENCE (C(2032),ZB18)	63	113
	EQUIVALENCE (C(2033),XB19)	63	114
	EQUIVALENCE (C(2034),YB19)	63	115

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115      C      C* AUTO-PILOT-DRIFT-RATES
          DX801 = -Q1*Y801/CRAJ
          DY801 = -Q1*X801 - P1*Z801/CRAJ
          DZ801 = P1*Y801/CRAJ
120      DX802 = -R2*Z802/CRAJ
          DY802 = -P2*Z802/CRAJ
          DZ802 = -P2*Y802 - R2*X802/CRAJ

      C
125      X801 = DX801*Y
          Y801 = 1. + DY801*Y
          Z801 = DZ801*Y
          X802 = DX802*Y
          Y802 = DY802*Y
          Z802 = 1. + DZ802*Y

130      B11 = A011*Y801 + A112*Y801 + A013*Y801
          B12 = A011*Y801 + A112*Y801 + A013*Y801
          B13 = A011*Y801 + A112*Y801 + A013*Y801
          B21 = A021*Y801 + A122*Y801 + A023*Y801
          B22 = A021*Y801 + A122*Y801 + A023*Y801
          B23 = A021*Y801 + A122*Y801 + A023*Y801
          B31 = A031*Y801 + A132*Y801 + A033*Y801
          B32 = A031*Y801 + A132*Y801 + A033*Y801
          B33 = A031*Y801 + A132*Y801 + A033*Y801
          X81 = B11*Y801 + B21*Y801 + B31*Y801
          Y81 = B12*Y801 + B22*Y801 + B32*Y801
          Z81 = B13*Y801 + B23*Y801 + B33*Y801
          X82 = B11*Y802 + B21*Y802 + B31*Y802
          Y82 = B12*Y802 + B22*Y802 + B32*Y802
          Z82 = B13*Y802 + B23*Y802 + B33*Y802
          BPH1 = ATANQ (Z81/Y81)
          BPS1 = ATANQ (-X81/Y81/COSD(BPH1))
          BTH2 = ATANQ (X82/Z82)
          BPH2 = ATANQ (-Y82/Z82/COSD(BTH2))

140      C* CALCULATION OF TOTAL VELOCITY
          VTOTE = SQR(VX*VX + VY*VY + VZ*VZ)
          ROELX = RIXE*VX
          ROELY = RIYE*VY
          ROELZ = RIZE*VZ

145      C
          IF (C1976)*LE-0.1, 20, 20
          RXL = RXE - RXD - VXJ*Y
          RYL = RYE - RYD - VYJ*Y
          RZL = RZE - RZD - VZJ*Y
          RANGO = SQR(RXL**2 + RYL**2 + RZL**2)
          VXL = VXE - VXO
          VYL = VYE - VYO
          VZL = VZE - VZO
          20 CONTINUE

150      C* TRANSFORM MISSILE LOS FROM EARLY TO RPT ARES
          C LINE OF SIGHT OF LASER SPOT WITH MONTE CARLO SPOT JITTER INCLUDED
          DO 500 I = 1, 100
          100 = 1
          500 = 1
          170

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173 IF(IINDX(1),NE,1500) GO TO 501
174 RSJYMC = GSPTI*SRP
175 CALL MCARLO (JUM,2,100)
176 SXPDU = M*40*(24-2.*ZETA*(SPO/MO - 3XP)
177 501 IF(IINDX(1),NE,1501) GO TO 500
178 RSJZMC = GSPTI*SRP
179 CALL MCARLO (JUM,2,100)
180 SYPDU = M*40*(RY - 2.*ZETA*(SPD/MO - SYP)
181 500 CONTINUE
182 RSPTIX = RDEL4
183 RSPTIY = RDEL1 + RSJYMC
184 RSPTIZ = RDEL2 + RSJZMC
185 RXBA = RSPTIX*CFAL1 + RSPTIY*CFAL2 + RSPTIZ*CFAL3
186 RYBA = RSPTIX*CFAL1 + RSPTIY*CFAL2 + RSPTIZ*CFAL3
187 RZBA = RSPTIX*CFAL1 + RSPTIY*CFAL2 + RSPTIZ*CFAL3
188 C
189 UVP1 = VXE*RDELX*VYE*ROELX
190 UVP2 = RDELX*RDELX*ROELX*ROELX
191 UVP3 = VZE*ROELZ
192 UVP4 = SRT(UVP2)
193 RANGE = SRT(UVP2+ROELZ**2)
194 C**VERTICAL AND HORIZONTAL LINE-OF-SIGHT ANGLES (EARTH AXES)
195 C
196 BLANH = ATANH(-ROELX/ROELX)
197 BLATV = ATANH(-ROELZ/UVP4)
198 C
199 C**VERTICAL AND HORIZONTAL PROPORTIONAL NAVIGATION ANGLES
200 IF(UTOTC,LE,10.) GO TO 30
201 VXP=(UVP1+UVP3)/RANGE
202 VYP = (VYE*RDELX-VXE*ROELX)/UVP4
203 VZP = (VZE*UVP2-ROELZ*UVP1)/(RANGE*UVP4)
204 BTHLV = ATANH(VZP/VXP)
205 BPSLV = ATANH(VY/VXP)
206 C
207 BGANV = ATANH(-VZE,SRT(VXE*VXE+VYE*VYE))
208 BGANH = ATANH(VYE,VXE)
209 C
210 C**VEL-SCIT-MRT AIR IN BODY AXES
211 VMHU = CFAL1*VMXE+CFAL2*VMHVE+CFAL3*VMHZE
212 VMHV = CFAL1*VMHVE+CFAL2*VMHVE+CFAL3*VMHZE
213 VMHW = CFAL1*VMHVE+CFAL2*VMHVE+CFAL3*VMHZE
214 C
215 C**VERTICAL AND HORIZONTAL ANGLES OF ATTACK
216 IF (COBURN,LE,0. .AVD. RANGC. LE,RALL) GO TO 30
217 BALPHA = ATANH(VMH,VMHU)
218 BALPHY = ATANH(VMV,VMHV)
219 C
220 C**ALPHA PRIME AND PHI PRIME (AJND TUNNEL AXES)
221 IF ((BALPHA-BALPHY).EQ,0.) GO TO 30
222 BPHIP = ATANH(BALPHY,BALPHA)
223 30 BALPHP=SRT(BALPHA**2+BALPHY**2)
224 RETURN
225 ENO

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VARIABLES SM TYPE RELOCATION

3256	CFA13	REAL	//	210	REFS	111	130	133	136	194	210
3262	CFA21	REAL	//	53	REFS	131	134	137	185	211	
3266	CFA22	REAL	//	54	REFS	131	134	137	185	211	
3272	CFA23	REAL	//	55	REFS	110	131	134	137	185	211
3276	CFA31	REAL	//	56	REFS	132	135	138	186	212	
3282	CFA32	REAL	//	57	REFS	132	135	138	186	212	
3306	CFA33	REAL	//	58	REFS	110	132	135	186	212	
3326	CRAD	REAL	//	59	REFS	117	110	119	128	121	122
560	QUM	REAL	//	174	REFS	178					
526	DX801	REAL	//	124	REFS	117					
531	DX802	REAL	//	127	REFS	120					
527	DX801	REAL	//	125	REFS	118					
532	DX802	REAL	//	128	REFS	121					
530	DX801	REAL	//	126	REFS	119					
533	DX802	REAL	//	129	REFS	122					
3031	GPOTY	REAL	//	39	REFS	173					
3043	GPOTZ	REAL	//	44	REFS	177					
556	I	INTEGER	//	171	REFS	172	176	DEFINED	170		
557	IDO	INTEGER	//	174	REFS	178	DEFINED	171			
7210	ITCT	INTEGER	//	36	REFS	170					
7250	ITNOX	ARRAY	//	35	REFS	49	172	176			
3343	P1	REAL	//	56	REFS	110	119				
3345	P2	REAL	//	58	REFS	121	122				
2574	QURN	REAL	//	11	REFS	215					
3344	Q1	REAL	//	67	REFS	117	110				
2444	RAIL	REAL	//	10	REFS	215					
562	RANGE	REAL	//	99	REFS	200	202	DEFINED	192		
573	RANGO	REAL	//	103	REFS	215	DEFINED	160			
3142	RDECK	REAL	//	18	REFS	101	108	2*189	195	201	
3143	RDELY	REAL	//	152	DEFINED						
3143	RDELY	REAL	//	19	REFS	102	190	2*189	195	201	
3144	RDELZ	REAL	//	153	DEFINED						
3144	RDELZ	REAL	//	20	REFS	103	190	192	196	202	
3217	RSJYMC	REAL	//	154	DEFINED						
3220	RSJZMC	REAL	//	30	REFS	102	DEFINED	173			
3221	RSPOTX	REAL	//	31	REFS	103	DEFINED	177			
3222	RSPOTY	REAL	//	32	REFS	104	105	106	DEFINED	181	
3223	RSPOTZ	REAL	//	33	REFS	104	105	106	DEFINED	182	
3162	RTXE	REAL	//	34	REFS	104	105	106	DEFINED	183	
3166	RTYE	REAL	//	21	REFS	152					
3172	RTZE	REAL	//	22	REFS	153					
3030	RX	REAL	//	23	REFS	154					
563	RXBA	REAL	//	30	REFS	175					
3116	RXE	REAL	//	100	DEFINED	184					
605	RXL	REAL	//	15	REFS	152	157				
3203	RXO	REAL	//	104	REFS	160	DEFINED	157			
3042	RY	REAL	//	24	REFS	157					
564	RYBA	REAL	//	43	REFS	179					
3122	RYE	REAL	//	101	DEFINED	105					
606	RYL	REAL	//	16	REFS	153					
3204	RYO	REAL	//	105	REFS	160	DEFINED	158			
565	RZBA	REAL	//	25	REFS	158					
3126	RZE	REAL	//	102	DEFINED	186					
607	RZL	REAL	//	17	REFS	154	159				
3205	RZO	REAL	//	106	DEFINED	159					

SUBROUTINE G5 7474 DPI 21

VARIABLES	SN	TYPE	RELOCATION
3346 R2	REAL	//	REFS
3035 SXP	REAL	//	REFS
3032 SXPD	REAL	//	REFS
3027 SXPD0	REAL	//	REFS
3047 SYP	REAL	//	REFS
3044 SYPO	REAL	//	REFS
3041 STPUD	REAL	//	REFS
3717 I	REAL	//	REFS
561 UWP1	REAL	//	REFS
562 UWP2	REAL	//	REFS
563 UWP3	REAL	//	REFS
564 UWP4	REAL	//	REFS
316 VAIRSP	REAL	//	REFS
570 VMU	REAL	//	REFS
571 VMV	REAL	//	REFS
572 VMW	REAL	//	REFS
307 VMXE	REAL	//	REFS
310 VMYE	REAL	//	REFS
311 VMZE	REAL	//	REFS
543 VTOTE	REAL	//	REFS
3102 VWE	REAL	//	REFS
553 VXL	* REAL	//	DEFINED
3209 VXD	REAL	//	REFS
565 VXP	REAL	//	REFS
3106 VYE	REAL	//	REFS
554 VYL	* REAL	//	DEFINED
3207 VYO	REAL	//	REFS
566 VVP	REAL	//	REFS
3112 VZE	REAL	//	REFS
555 VZL	* REAL	//	DEFINED
3210 VZO	REAL	//	REFS
567 VZP	REAL	//	REFS
3053 WQ	REAL	//	REFS
3347 XB01	REAL	//	REFS
3352 XB02	REAL	//	REFS
545 XB1	REAL	//	REFS
550 XB2	REAL	//	REFS
3350 YB01	REAL	//	REFS
3353 YB02	REAL	//	REFS
546 YB1	REAL	//	REFS
551 YB2	REAL	//	REFS
3351 ZB01	REAL	//	REFS
3354 ZB02	REAL	//	REFS
547 ZB1	REAL	//	REFS
552 ZB2	REAL	//	REFS
3052 ZE1A	REAL	//	REFS

EXTERNALS	TYPE	ARGS	REFERENCES
CUSD	REAL	1	146
MCARLO	REAL	3	174
SQRT	REAL	1	151

STATEMENT LABELS	DEF LINE	REFERENCES
243 20	164	155
435 30	222	193
275 500	190	170
261 501	176	172

LOOPS LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES	EXT REFS
244 500	1	170-180	348		

COMMON BLOCKS	LENGTH	MEMBERS	BIAS NAME(LENGTH)
/ /	3830	0 C	13830

EQUIV CLASSES	LENGTH	MEMBERS	BIAS NAME(LENGTH)
C	3830	199 VMXE (1)	200 VMAYE (1)
		205 VAIRS (1)	349 BT4T (1)
		351 B54I (1)	352 BP4I (1)
		354 BPS1 (1)	355 VTJTE (1)
		357 B54HV (1)	362 BTHLV (1)
		364 BLAMV (1)	365 BLAMV (1)
		367 B4LPHV (1)	368 B4LPHV (1)
		370 RANGE (1)	371 RX3A (1)
		373 RZBA (1)	373 RANGO (1)
		390 MYL (1)	391 RZL (1)
		4315 44IL (1)	1404 GOURN (1)
		1563 MX (1)	1531 GSPOTY (1)
		1565 SX (1)	1559 SV200 (1)
		1571 GSPOTZ (1)	1572 SY20 (1)
		1578 ZETA (1)	1579 M0 (1)
		1505 VYE (1)	1610 VZE (1)
		1618 VYE (1)	1622 RZE (1)
		1635 MDLY (1)	1636 RDELZ (1)
		1654 MYE (1)	1638 RIZE (1)
		1668 RYO (1)	1639 RZ3 (1)
		1671 VY3 (1)	1672 VZ3 (1)
		1680 RSJZH3 (1)	1681 RSJYMC (1)
		1683 MSPOTZ (1)	1702 CF411 (1)
		1710 CF413 (1)	1714 C-A21 (1)
		1722 CFA23 (1)	1725 CFA31 (1)
		1734 CFA33 (1)	1750 C440 (1)
		1755 A022 (1)	1756 A023 (1)
		1758 A032 (1)	1759 A033 (1)
		1761 A112 (1)	1762 A013 (1)
		1764 Q1 (1)	1765 P2 (1)
		1767 X301 (1)	1768 Y331 (1)
		1770 X302 (1)	1771 Y302 (1)
		1993 I (1)	3720 TCT (1)
			201 VMZE (1)
			350 BPSI (1)
			353 BTM2 (1)
			356 BGAMH (1)
			363 BPSLV (1)
			366 BALPHA (1)
			369 BPHIP (1)
			372 RYBA (1)
			389 RXL (1)
			392 BPH2 (1)
			1559 SXPO0 (1)
			1562 SXPO (1)
			1570 RY (1)
			1575 SYP (1)
			1602 VXE (1)
			1614 RXE (1)
			1634 RDELX (1)
			1650 RIVE (1)
			1667 RX0 (1)
			1670 VXD (1)
			1679 RSJYMC (1)
			1682 RSPOTY (1)
			1706 CF412 (1)
			1718 CFA22 (1)
			1730 CFA32 (1)
			1754 A021 (1)
			1757 A031 (1)
			1768 A011 (1)
			1763 P1 (1)
			1766 R2 (1)
			1769 Z801 (1)
			1772 Z802 (1)
			3752 ITNDX (10)

STATISTICS	PROGRAM LENGTH	CH BLANK COMMON LENGTH
	3738	379
	73653	3830

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3

[illegible]

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
1-41	1	164
VARIABLES SN TYPE RELOCATION		
556 BALPHA	REAL	17 REFS
560 BALPHI	REAL	19 REFS
557 BALPHY	REAL	18 REFS
2312 BAP	REAL	53 REFS
		129
2116 BOELT1	REAL	106 DEFINED
2122 BOELT2	REAL	21 REFS
2126 BOELT3	REAL	22 REFS
2132 BOELT4	REAL	23 REFS
2313 BDL	REAL	24 REFS
2314 BDM	REAL	64 REFS
2315 BDN	REAL	65 REFS
2316 BDP	REAL	66 REFS
2317 BDQ	REAL	67 REFS
		58 REFS
2320 BDR	REAL	96 DEFINED
		97 REFS
561 BPHIP	REAL	97 DEFINED
0 C	REAL	20 REFS
	ARRAY	22 REFS
		32
		42
		52
		60
		68
		75
0 CA1	REAL	5 REFS
0 CA2	REAL	5 REFS
0 CA3	REAL	5 REFS
0 CA4	REAL	13 REFS
0 CA5	REAL	5 REFS
2323 CH1	REAL	70 REFS
2327 CH11	REAL	74 REFS
2324 CH2	REAL	71 REFS
2330 CH21	REAL	75 REFS
2325 CH3	REAL	72 REFS
2331 CH31	REAL	76 REFS
2326 CH4	REAL	73 REFS
2332 CH41	REAL	77 REFS
2270 CL	REAL	63 REFS
0 CLOF	REAL	5 REFS
2310 CLUP	REAL	51 REFS
2265 CLP	REAL	40 REFS
0 CLPF	REAL	5 REFS
0 CL2F	REAL	5 REFS
0 CL4F	REAL	5 REFS
2271 CM	REAL	44 REFS
0 CMDF	REAL	5 REFS
2303 CMQ	REAL	56 REFS
2304 CMR	REAL	57 REFS
		107
		106
		108
		110
		131
		132
		133
		122
		123
		124
		125
		127
		140
		141
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		163
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		163
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		140
		159
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		127
		149
		126
		150
		149
		126

VARIABLES	SN	TYPE	RELOCATION	REF	112	137	DEFINED	108	112	157	150
552 UBT	REAL				112	149	150	151	136		
545 UCPHI	REAL				89						
3022 UDL1	REAL		/ /		99		100	101			
3023 UDL2	REAL		/ /		99		100	101			
3024 UDL3	REAL		/ /		28		100	101			
3025 UDL4	REAL		/ /		29		100	101			
544 USPHI	REAL		/ /		148	149	150	151	156	157	150
546 US2PHI	REAL				DEFINED	88					
550 US2PH2	REAL				92	135	DEFINED	90			
547 US4PHI	REAL				148	149	DEFINED	92			
553 UT	REAL				150	151	155	DEFINED	91		
2311 VM	REAL		/ /		117	DEFINED	118				
					52	113	114	119	120	122	123
					124	125	127	131	132	133	135
					137	139	140	142	143		
					139	113	114				
313 VHACH	REAL		/ /		16	109					
554 XF	REAL				119	120	122	123	124	125	127
					131	132	133	135	137	139	140
					142	143	DEFINED	121	130	134	136

EXTERNALS	TYPE	ARGS	REFERENCES
COSD	REAL	1	161
SIN	REAL	1	LIBRARY 161
SIND	REAL	1	90
TABLE		7	113
TABLE2		8	120
			122
			135

INLINE FUNCTIONS	TYPE	ARGS	DEF LINE	REFERENCES
ABS	REAL	1	INTRIN	103
AMAX1	REAL	6	INTRIN	103
STATEMENT LABELS			DEF LINE	REFERENCES
45 15			102	98
165 1000			145	117

COMMON BLOCKS	LENGTH	MEMBERS	BIAS NAME (LENGTH)
/ /	303C	0 C	(3030)
NC1	2	0 NC1	(2)
NC2	4	0 NC2	(4)
NC3	4	0 NC3	(4)
NC5	4	0 NC5	(4)
CA1	6	0 CA1	(6)
CA2	12	0 CA2	(12)
CA3	12	0 CA3	(12)
CA5	10	0 CA5	(10)
CZPF	35	0 CZPF	(35)
CZ2F	35	0 CZ2F	(35)
CHPF	35	0 CHPF	(35)
CM2F	35	0 CM2F	(35)
CY4F	36	0 CY4F	(36)
CN4F	36	0 CN4F	(36)
CL4F	21	0 CL4F	(21)
CL2F	21	0 CL2F	(21)

COMMON BLOCKS	LENGTH	MEMBERS	BIAS	NAME(LENGTH)
CZDF	35	0 CZDF	(35)	
CMQF	35	0 CMQF	(35)	
CMQF	36	0 CMQF	(36)	
CLPF	36	0 CLPF	(36)	
CLUF	21	0 CLUF	(21)	
CXOF	6	0 CXOF	(6)	
CMOF	6	0 CMOF	(6)	
CA4	6	0 CA4	(6)	

EQUIV CLASSES	LENGTH	MEMBERS	BIAS	NAME(LENGTH)
C	303C	203 VMA24	(1)	
		358 BA_PMP	(1)	
		1105 80ELT2	(1)	
		1199 0PTMNG	(1)	
		1204 CZ	(1)	
		1207 CVR	(1)	
		1210 CV	(1)	
		1213 UZ22	(1)	
		1215 UZY4	(1)	
		1219 CMQ	(1)	
		1222 UC1	(1)	
		1225 V4	(1)	
		1228 80M	(1)	
		1231 802	(1)	
		1234 UZL3A	(1)	
		1237 C43	(1)	
		1243 CM21	(1)	
		1350 OPTM	(1)	
		1556 UJ3	(1)	
		2313 L2DNV	(1)	

365 BAPHA	(1)	367 BAPHY	(1)
359 BP4IP	(1)	1102 80ELT1	(1)
1110 80ELT3	(1)	1114 80ELT4	(1)
1202 2K	(1)	1203 CY	(1)
1205 CLP	(1)	1206 CMQ	(1)
1208 CL	(1)	1209 CM	(1)
1211 CX3	(1)	1212 CZ0	(1)
1214 CZ22	(1)	1215 CZ0R	(1)
1217 CM2	(1)	1219 DCM2	(1)
1220 CM3R	(1)	1221 DCM4	(1)
1223 C224	(1)	1224 CL0P	(1)
1225 8AP	(1)	1227 80L	(1)
1228 80N	(1)	1230 80P	(1)
1232 80R	(1)	1233 DCL00	(1)
1235 C41	(1)	1236 CM2	(1)
1239 C44	(1)	1239 CM11	(1)
1241 C431	(1)	1242 CM41	(1)
1554 UDL1	(1)	1555 UDL2	(1)
1557 UDL4	(1)	1939 T	(1)

STATISTICS

PROGRAM LENGTH	5453	421
CM LABELED COMMON LENGTH	7313	489
CM BLANK COMMON LENGTH	7368	3830


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C**MONTE CARLO TIDFF ROLL, PITCH AND YAW RATES
IFISNDX(I),EQ.1735)CALL ACRLD(OUN,1,100)
IFISNDX(I),EQ.1745)IFLG2=0
IFISNDX(I),EQ.1742)IFLG1=0
5 CONTINUE
C
IFW18,LE.0.120 TO 6
CALL LTRAN(I,DELT,C(1746),DJM,MRO,IFLG2,1)
CALL LTRAN(I,DELT,C(1742),DJM,MRO,IFLG1,2)
WO=WC/FHIYF *GRAD
WR=WR0/FHIYF *GRAD
6 CONTINUE
IFLG1=1 F IFLG2=1
C
RETURN
10 CONTINUE
FTHRST=0.
FTHK=0.
FTHY=0.
FTHZ=0.
FMTH=0.
FMZTH=0.
FMZTH=0.
DMSS = 0.1732.1/4
ROELCG = ROCSF
FMIX = FMIYF
FMIY = FMIYF
FMIZ = FMIYF
85 RETURN
END

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SYMBOLIC REFERENCE MAP (R=3)									
ENTR/	POINTS	DEF	LINE	REFERENCES					
1	A31		1	72	85				
VARIABLES SN TYPE RELOCATION									
556	BALPHA	REAL			REFS	6	DEFINED	45	
557	BALPHY	REAL			REFS	7	DEFINED	46	
561	BPHIP	REAL			REFS	8	DEFINED	47	
0	C	REAL		ARRAY	REFS	3	2*5	6	7
					REFS	11	13	14	15
					REFS	12	21	22	23
					REFS	19	29	30	31
					REFS	20	37	38	39
					REFS	27	40	41	42
3325	CRAD	REAL			REFS	31	57	58	59
146	DEL	REAL			REFS	55	56	57	58
3133	DMASS	REAL			REFS	21	DEFINED	81	
145	OUN	REAL			REFS	53	54	55	56
					REFS	65	56	57	59
2606	DMT	REAL			REFS	17	81		
3323	FMIX	REAL			REFS	25	DEFINED	83	
2612	FMIXF	REAL			REFS	19	83		
3324	FMIY	REAL			REFS	26	DEFINED	84	
2613	FMIYF	REAL			REFS	20	57	58	85
3325	FMIZ	REAL			REFS	27	DEFINED	85	
3310	FMX	REAL			REFS	33	DEFINED	41	
2447	FMXTH	REAL			REFS	10	DEFINED	78	
3314	FMY	REAL			REFS	33	DEFINED	41	
2450	FMYTH	REAL			REFS	11	DEFINED	79	
3320	FMZ	REAL			REFS	33	DEFINED	41	
2451	FMZTH	REAL			REFS	12	DEFINED	80	
151	FTHIRST	REAL			DEFINED	74			
2602	FTHX	REAL			REFS	14	DEFINED	75	
2603	FTHY	REAL			REFS	15	DEFINED	76	
2604	FTHZ	REAL			REFS	16	DEFINED	77	
143	I	INTEGER			REFS	32	33	34	35
					REFS	31	DEFINED	31	37
					REFS	50	54	55	56
144	IOO	INTEGER			REFS	53	56	57	59
					DEFINED	52			
135	IFLG1	INTEGER			REFS	56	DEFINED	34	61
136	IFLG2	INTEGER			REFS	65	DEFINED	34	60
5001	IPL	INTEGER		ARRAY	REFS	4	30	DEFINED	35
7061	ISNOX	INTEGER		ARRAY	REFS	4	5	53	54
					REFS	50	61	55	56
6667	I3512	INTEGER			REFS	5	51		
5603	N	INTEGER			REFS	27	35	36	DEFINED
2574	QBURN	REAL			REFS	13	39		36
2611	ROCGF	REAL			REFS	18	82		
2433	ROELCG	REAL			REFS	9	DEFINED	82	
3717	T	REAL			REFS	28	65	66	
					REFS	32	56		
1161	VIB	REAL			REFS	22		42	
3312	WP	REAL			REFS	23		43	67
3316	WQ	REAL			REFS	24		44	
150	W30	REAL			REFS	56	57		
3322	WR	REAL			REFS	24	DEFINED	44	68
147	WR0	REAL			REFS	55	58		

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EXTERNALS	TYPE	ARGS	REFERENCES
LYRAM		7	55
MCARLO		3	53

STATEMENT LABELS	DEF LINE	REFERENCES
0 5	62	51
74 6	69	64
76 10	73	33

LOOPS LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES
16 5	I	51 62	448	EXT REFS

COMMON BLOCKS	LENGTH	MEMBERS	BIAS NAME(LENGTH)
/	3030	0 C	(3030)

EQUIV CLASSES	LENGTH	MEMBERS	BIAS NAME(LENGTH)
C	3030	366 BALPHA (1)	357 BALPHY (1)
		625 VIA (1)	1307 ROELCC (1)
		1320 P4YTH (1)	1321 FM14 (1)
		1410 FT4K (1)	1411 FTAY (1)
		1414 DAT (1)	1417 RD2GF (1)
		1413 F4IYF (1)	1418 FM1XF (1)
		1738 W2 (1)	1627 DMASS (1)
		1744 F4Z (1)	1749 FMV (1)
		1748 FM1Y (1)	1745 W2 (1)
		1993 I (1)	1749 FM1Z (1)
		3511 J3512 (1)	2560 N (1)
			3533 ISMJK (40)
			369 BPHIP (1)
			1319 FM1M (1)
			1604 QBURN (1)
			1412 FMZ (1)
			1742 WQ (1)
			1747 FM1X (1)
			1750 CRAD (1)
			2561 IPL (100)

STATISTICS	PROGRAM LENGTH	CH BLANK COMMON LENGTH
	1023	106
	73668	3030

Line	Code	Statement	Label
5	C	SUBROUTINE A3	A3
10	C	C**ENGINE MODULE	A3
15	C	COMMON C(3630)	A3
20	C	C**INPUT DATA	A3
25	C	EQUIVALENCE (C(1131),RFXCG)	A3
30	C	EQUIVALENCE (C(1131),RFYCG)	A3
35	C	EQUIVALENCE (C(1131),RFZCG)	A3
40	C	EQUIVALENCE (C(1131),BALPHI)	A3
45	C	EQUIVALENCE (C(1131),BPHI)	A3
50	C	EQUIVALENCE (C(1131),2NALGN)	A3
55	C	EQUIVALENCE (C(1131),PORTH)	A3
60	C	EQUIVALENCE (C(1131),QBURN)	A3
65	C	EQUIVALENCE (C(1131),CISP)	A3
70	C	EQUIVALENCE (C(1131),DMT)	A3
75	C	EQUIVALENCE (C(1131),DKP)	A3
80	C	EQUIVALENCE (C(1131),RUGGO)	A3
85	C	EQUIVALENCE (C(1131),RUGGF)	A3
90	C	EQUIVALENCE (C(1131),FMIKF)	A3
95	C	EQUIVALENCE (C(1131),FMIYF)	A3
100	C	EQUIVALENCE (C(1131),RLCGO)	A3
105	C	C**INPUTS FROM OTHER MODULES	A3
110	C	EQUIVALENCE (C(1200),I)	A3
115	C	C**OUTPUTS	A3
120	C	EQUIVALENCE (C(1138),ROELCG)	A3
125	C	EQUIVALENCE (C(1132),FMATM)	A3
130	C	EQUIVALENCE (C(1132),FMZTH)	A3
135	C	EQUIVALENCE (C(1132),FMZTH)	A3
140	C	EQUIVALENCE (C(1132),UDMP)	A3
145	C	EQUIVALENCE (C(1141),FTHRST)	A3
150	C	EQUIVALENCE (C(1141),FTHX)	A3
155	C	EQUIVALENCE (C(1141),FTHY)	A3
160	C	EQUIVALENCE (C(1141),FTHZ)	A3
165	C	EQUIVALENCE (C(1142),RLCG)	A3
170	C	EQUIVALENCE (C(1142),DRASS)	A3
175	C	EQUIVALENCE (C(1148),FMIK)	A3
180	C	EQUIVALENCE (C(1149),FMIY)	A3
185	C	EQUIVALENCE (C(1150),FMIZ)	A3
190	C	C**STATE VARIABLES AND THEIR DERIVATIVES	A3
195	C	EQUIVALENCE (C(1149),UIMP)	A3
200	C	EQUIVALENCE (C(1149),UIMP)	A3
205	C	C**LOOK UP TABLE FOR THRUST	A3
210	C	DATA NTH(10), ITH(10), ITH(10)	A3
215	C	DATA NTH(10), ITH(10), ITH(10)	A3
220	C	DATA ITH(73)0.,125.,250.,750.,1500.,1625.,1750.,200.,300.,400.,500.,600.,700.,800.,900.,1000.,1100.,1200.,1300.,1400.,1500.,1600.,1700.,1800.,1900.,2000.,2100.,2200.,2300.,2400.,2500.,2600.,2700.,2800.,2900.,3000.,3100.,3200.,3300.,3400.,3500.,3600.,3700.,3800.,3900.,4000.,4100.,4200.,4300.,4400.,4500.,4600.,4700.,4800.,4900.,5000.,5100.,5200.,5300.,5400.,5500.,5600.,5700.,5800.,5900.,6000.,6100.,6200.,6300.,6400.,6500.,6600.,6700.,6800.,6900.,7000.,7100.,7200.,7300.,7400.,7500.,7600.,7700.,7800.,7900.,8000.,8100.,8200.,8300.,8400.,8500.,8600.,8700.,8800.,8900.,9000.,9100.,9200.,9300.,9400.,9500.,9600.,9700.,9800.,9900.,10000.	A3
225	C	DATA ITH(73)0.,125.,250.,750.,1500.,1625.,1750.,200.,300.,400.,500.,600.,700.,800.,900.,1000.,1100.,1200.,1300.,1400.,1500.,1600.,1700.,1800.,1900.,2000.,2100.,2200.,2300.,2400.,2500.,2600.,2700.,2800.,2900.,3000.,3100.,3200.,3300.,3400.,3500.,3600.,3700.,3800.,3900.,4000.,4100.,4200.,4300.,4400.,4500.,4600.,4700.,4800.,4900.,5000.,5100.,5200.,5300.,5400.,5500.,5600.,5700.,5800.,5900.,6000.,6100.,6200.,6300.,6400.,6500.,6600.,6700.,6800.,6900.,7000.,7100.,7200.,7300.,7400.,7500.,7600.,7700.,7800.,7900.,8000.,8100.,8200.,8300.,8400.,8500.,8600.,8700.,8800.,8900.,9000.,9100.,9200.,9300.,9400.,9500.,9600.,9700.,9800.,9900.,10000.	A3
230	C	DATA ITH(73)0.,125.,250.,750.,1500.,1625.,1750.,200.,300.,400.,500.,600.,700.,800.,900.,1000.,1100.,1200.,1300.,1400.,1500.,1600.,1700.,1800.,1900.,2000.,2100.,2200.,2300.,2400.,2500.,2600.,2700.,2800.,2900.,3000.,3100.,3200.,3300.,3400.,3500.,3600.,3700.,3800.,3900.,4000.,4100.,4200.,4300.,4400.,4500.,4600.,4700.,4800.,4900.,5000.,5100.,5200.,5300.,5400.,5500.,5600.,5700.,5800.,5900.,6000.,6100.,6200.,6300.,6400.,6500.,6600.,6700.,6800.,6900.,7000.,7100.,7200.,7300.,7400.,7500.,7600.,7700.,7800.,7900.,8000.,8100.,8200.,8300.,8400.,8500.,8600.,8700.,8800.,8900.,9000.,9100.,9200.,9300.,9400.,9500.,9600.,9700.,9800.,9900.,10000.	A3
235	C	IF (QBURN.GT.0.) RETURN	A3
240	C	CALL TABLE(I,TH,TF,NTH,XF,6H*THRST,FT*THRST)	A3
245	C	IF (QNALGN) 20,23,10	A3
250	C	USINA=SIN(BALPHI)	A3
255	C	FTHK=FT*THRST*CS3U(BALPHI)	A3

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      FTHY=FTHRST*JSINA*SIND(BPHI)
      FTHZ=FTHRST*JSINA*COS(BPHI)
      FMXTH = -FTHY*RFZCG + FT4Z*FYCG
      FMYTH = FTHX*RFZCG + FT4Z*FXCG
      FMZTH = -FTHX*RFYCG + FTHY*FXCG
      GO 10,30
20 FTHX=FTHRST
   FTHY=0.
   FTHZ=0.
   FMXTH=0.
   FMYTH=0.
   FMZTH=0.
30 CONTINUE
      UIMPD = FTHRST
      UONP = UIMP/CISP
      QHASS = (OWI+OWP+OWP2)/32.174
      ROELCG = ROCGO - (ROCGO - RCGFI*UONP/OWP)
      FMIX=FMIXF*(DAT+OWP-UONP)/DAT
      FMIX=FMIXF*(DAT+OWP-UONP)/DAT
      FMIZ = FMIX
      RLCS = RLCSO + ROELCS
      IF (FTHRST .GT. 0.) RETURN
      WRITE (6,100) T
100 FORMAT('//14H BURNDJT TIME=F0.4+5H SEC. ')
      QBURN=1.0
      RETURN
      END

```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES	1	52	82	87
VARIABLES	SN	TYPE	RELOCATION			
2570 BALPHI	REAL	/ /	REFS	10	56	57
2571 3PHIT	REAL	/ /	REFS	11	58	59
U C	REAL	ARRAY / /	REFS	3	7	8
				14	15	16
				22	25	28
				33	35	36
				41	45	
2605 CISP	REAL	/ /	REFS	15	73	
3133 DMAS	REAL	/ /	REFS	38	DEFINED	75
2607 DMP	REAL	/ /	REFS	17	75	76
2606 DMT	REAL	/ /	REFS	16	75	2*79
3323 FMIX	REAL	/ /	REFS	39	DEFINED	78
2612 FMIXF	REAL	/ /	REFS	20	78	
3324 FMIY	REAL	/ /	REFS	40	80	DEFINED 79
2613 FMIF	REAL	/ /	REFS	21	79	
3325 FMIZ	REAL	/ /	REFS	41	DEFINED	80
2447 FMTH	REAL	/ /	REFS	29	DEFINED	50
2450 FMTH	REAL	/ /	REFS	30	DEFINED	61
2451 FMTH	REAL	/ /	REFS	31	DEFINED	62
2601 FTHRS1	REAL	/ /	REFS	33	53	57
				82	58	59
2602 FTHX	REAL	/ /	REFS	34	61	DEFINED 57
2603 FTHY	REAL	/ /	REFS	35	60	DEFINED 58
2604 FTHZ	REAL	/ /	REFS	36	60	DEFINED 59
114 NTH	INTEGER	ARRAY	REFS	47	53	DEFINED 48
2573 PCFTM	REAL	/ /	REFS	13		
2574 QBURN	REAL	/ /	REFS	14	52	DEFINED 86
2572 QNALGN	REAL	/ /	REFS	12	55	
2611 RDCGF	REAL	/ /	REFS	19	76	
2610 RDCGO	REAL	/ /	REFS	18	2*76	
2433 RDELGG	REAL	/ /	REFS	28	81	DEFINED 76
2440 RFYCG	REAL	/ /	REFS	7	61	62
2441 RFYCG	REAL	/ /	REFS	8	60	62
2442 RFZCG	REAL	/ /	REFS	9	50	61
2615 RLGG	REAL	/ /	REFS	37	DEFINED	81
2614 RLGO	REAL	/ /	REFS	22	81	
3717 I	REAL	/ /	REFS	25	53	84
116 THA	REAL	ARRAY	REFS	47	53	DEFINED 49
130 THF	REAL	ARRAY	REFS	47	53	DEFINED 50
2600 UOMP	REAL	/ /	REFS	32	75	76
				73	76	79
2732 UIMP	REAL	/ /	REFS	45		
2727 UIMPO	REAL	/ /	REFS	44	DEFINED	72
113 USINA	REAL		REFS	58	59	DEFINED 56
112 XF	* REAL		REFS	53		

FILE NAMES MOJE
TAPE6 FMT WRITES 84

EXTERNALS TYPE ARGS REFERENCES
 COSD REAL 1 57 59
 SIND REAL 1 55 58
 TABLE 7 53

STATEMENT LABELS DEF LINE REFERENCES

0 10 INACTIVE 56 55
 33 20 64 255
 37 30 70 63
 103 100 FMT 85 04

COMMON BLOCKS LENGTH MEMBERS - BIAS NAME(LENGTH)
 / / 3030 3.5 (3630)

EQUIV-CLASSES LENGTH MEMBERS - BIAS NAME(LENGTH)
 C 3030
 1307 RDELCS (1)
 1314 RFYCG (1)
 1319 FMTH (1)
 1320 FMTH (1)
 1401 BPHIT (1)
 1404 QBURN (1)
 1409 FT4RST (1)
 1410 FTHX (1)
 1413 CISP (1)
 1415 DWP (1)
 1416 RDCGO (1)
 1419 FMIF (1)
 1421 RLGG (1)
 1422 DMAS (1)
 1498 UIMP (1)
 1749 FMIZ (1)
 1312 RFYCG (1)
 1319 FMTH (1)
 1401 BPHIT (1)
 1404 QBURN (1)
 1409 FT4RST (1)
 1410 FTHX (1)
 1413 CISP (1)
 1415 DWP (1)
 1416 RDCGO (1)
 1419 FMIF (1)
 1421 RLGG (1)
 1422 DMAS (1)
 1498 UIMP (1)
 1749 FMIZ (1)

STATISTICS

PROGRAM LENGTH 1443 100
 CH BLANK COMMON LENGTH 73663 3030

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SUBROUTINE A2
COMMON C(3830)
101 FORMAT(10,4X,214FRONT LUG 3LEARS RAIL,5X,1-T *,1PE10.2,5X,
      9HREL VEL *,1PE10.2,5X,14HPITCH YOMENT *,1PE10.2)
C
C**INPUT DATA
EQUIVALENCE (C(1306),RFAREA)
EQUIVALENCE (C(1307),RFLGTH)
EQUIVALENCE (C(1316),RLUG )
EQUIVALENCE (C(1317),RAIL )
EQUIVALENCE (C(1742), AMP2), (C(1746), AMP1)
EQUIVALENCE (C(1332),CPHAS )
EQUIVALENCE (C(1405),QBURN )
EQUIVALENCE (C(1627),AGRAV )
C
C**INPUTS FROM OTHER MODULES
DIMENSION ISN(140)
EQUIVALENCE (C(3534), ISN(1), (C(3512), I3512)
EQUIVALENCE (C(1203),PDYHNC)
EQUIVALENCE (C( 204),VMACH )
EQUIVALENCE (C(1207),VA1SP)
EQUIVALENCE (C( 350),BTHT )
EQUIVALENCE (C( 380),RANSO )
EQUIVALENCE (C(1203),CX )
EQUIVALENCE (C(1204),CY )
EQUIVALENCE (C(1205),CZ )
EQUIVALENCE (C(1207),CMQ )
EQUIVALENCE (C(1208),CNR )
EQUIVALENCE (C(1203),CL )
EQUIVALENCE (C(1210),CH )
EQUIVALENCE (C(1211),CN )
EQUIVALENCE (C(1236),CH1 )
EQUIVALENCE (C(1237),CH2 )
EQUIVALENCE (C(1238),CH3 )
EQUIVALENCE (C(1239),CH4 )
EQUIVALENCE (C(1320),FMXTH )
EQUIVALENCE (C(1321),FMYTH )
EQUIVALENCE (C(1322),FMZTH )
EQUIVALENCE (C(1411),FTX )
EQUIVALENCE (C(1412),FTY )
EQUIVALENCE (C(1413),FTZ )
EQUIVALENCE (C(1422),RLCS )
EQUIVALENCE (C(1723),CFA23 )
EQUIVALENCE (C(1735),CFA33 )
EQUIVALENCE (C(1739),WP )
EQUIVALENCE (C(1743),MQ )
EQUIVALENCE (C(1737), FM), (C(1741), FM), (C(1745), FM2)
EQUIVALENCE (C(1747),WR )
EQUIVALENCE (C(1749), FHI)
EQUIVALENCE (C(1738), WPTD)
EQUIVALENCE (C(1751), GRAD)
EQUIVALENCE (C( 525), V13)
EQUIVALENCE (C(2000),T )
EQUIVALENCE (C(1972),RKUTTA)
EQUIVALENCE (C(1975),NPTI)

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C			
C**OUIPUTS			
60	EQUIVALENCE (C(1301),FXBA)	A2	59
	EQUIVALENCE (C(1301),FYBA)	A2	60
	EQUIVALENCE (C(1302),FZBA)	A2	61
	EQUIVALENCE (C(1303),FMXBA)	A2	62
	EQUIVALENCE (C(1304),FMYBA)	A2	63
	EQUIVALENCE (C(1305),FMZBA)	A2	64
65	EQUIVALENCE (C(1306),RDELCS)	A2	65
	EQUIVALENCE (C(1307),RDELCS)	A2	66
	EQUIVALENCE (C(1308),RDELCS)	A2	67
	EQUIVALENCE (C(1309),RDELCS)	A2	68
	EQUIVALENCE (C(1310),RDELCS)	A2	69
	EQUIVALENCE (C(1311),RDELCS)	A2	70
70	EQUIVALENCE (C(1312),FMH1)	A2	71
	EQUIVALENCE (C(1313),FMH2)	A2	72
	EQUIVALENCE (C(1314),FMH3)	A2	73
	EQUIVALENCE (C(1315),FMH4)	A2	74
	EQUIVALENCE (C(1316),FMH5)	A2	75
	EQUIVALENCE (C(1317),FMH6)	A2	76
	EQUIVALENCE (C(1318),FMH7)	A2	77
	EQUIVALENCE (C(1319),FMH8)	A2	78
	EQUIVALENCE (C(1320),FMH9)	A2	79
90	EQUIVALENCE (C(1321),FMH10)	A2	80
	EQUIVALENCE (C(1322),FMH11)	A2	81
	EQUIVALENCE (C(1323),FMH12)	A2	82
	EQUIVALENCE (C(1324),FMH13)	A2	83
	EQUIVALENCE (C(1325),FMH14)	A2	84
	EQUIVALENCE (C(1326),FMH15)	A2	85
	EQUIVALENCE (C(1327),FMH16)	A2	86
	EQUIVALENCE (C(1328),FMH17)	A2	87
	EQUIVALENCE (C(1329),FMH18)	A2	88
	EQUIVALENCE (C(1330),FMH19)	A2	89
	EQUIVALENCE (C(1331),FMH20)	A2	90
	EQUIVALENCE (C(1332),FMH21)	A2	91
	EQUIVALENCE (C(1333),FMH22)	A2	92
	EQUIVALENCE (C(1334),FMH23)	A2	93
	EQUIVALENCE (C(1335),FMH24)	A2	94
	EQUIVALENCE (C(1336),FMH25)	A2	95
	EQUIVALENCE (C(1337),FMH26)	A2	96
	EQUIVALENCE (C(1338),FMH27)	A2	97
	EQUIVALENCE (C(1339),FMH28)	A2	98
	EQUIVALENCE (C(1340),FMH29)	A2	99
	EQUIVALENCE (C(1341),FMH30)	A2	100
	EQUIVALENCE (C(1342),FMH31)	A2	101
	EQUIVALENCE (C(1343),FMH32)	A2	102
	EQUIVALENCE (C(1344),FMH33)	A2	103
	EQUIVALENCE (C(1345),FMH34)	A2	104
	EQUIVALENCE (C(1346),FMH35)	A2	105
	EQUIVALENCE (C(1347),FMH36)	A2	106
	EQUIVALENCE (C(1348),FMH37)	A2	107
	EQUIVALENCE (C(1349),FMH38)	A2	108
	EQUIVALENCE (C(1350),FMH39)	A2	109
	EQUIVALENCE (C(1351),FMH40)	A2	110
	EQUIVALENCE (C(1352),FMH41)	A2	111
	EQUIVALENCE (C(1353),FMH42)	A2	112
	EQUIVALENCE (C(1354),FMH43)	A2	113
	EQUIVALENCE (C(1355),FMH44)	A2	114
	EQUIVALENCE (C(1356),FMH45)	A2	115
C			
C**OTHER OUTPUTS			
	EQUIVALENCE (C(1309),FMH1)	A2	74
	EQUIVALENCE (C(1310),FMH2)	A2	75
	EQUIVALENCE (C(1311),FMH3)	A2	76
	EQUIVALENCE (C(1312),FMH4)	A2	77
	EQUIVALENCE (C(1313),FMH5)	A2	78
	EQUIVALENCE (C(1314),FMH6)	A2	79
	EQUIVALENCE (C(1315),FMH7)	A2	80
	EQUIVALENCE (C(1316),FMH8)	A2	81
	EQUIVALENCE (C(1317),FMH9)	A2	82
	EQUIVALENCE (C(1318),FMH10)	A2	83
	EQUIVALENCE (C(1319),FMH11)	A2	84
	EQUIVALENCE (C(1320),FMH12)	A2	85
	EQUIVALENCE (C(1321),FMH13)	A2	86
	EQUIVALENCE (C(1322),FMH14)	A2	87
	EQUIVALENCE (C(1323),FMH15)	A2	88
	EQUIVALENCE (C(1324),FMH16)	A2	89
	EQUIVALENCE (C(1325),FMH17)	A2	90
	EQUIVALENCE (C(1326),FMH18)	A2	91
	EQUIVALENCE (C(1327),FMH19)	A2	92
	EQUIVALENCE (C(1328),FMH20)	A2	93
	EQUIVALENCE (C(1329),FMH21)	A2	94
	EQUIVALENCE (C(1330),FMH22)	A2	95
	EQUIVALENCE (C(1331),FMH23)	A2	96
	EQUIVALENCE (C(1332),FMH24)	A2	97
	EQUIVALENCE (C(1333),FMH25)	A2	98
	EQUIVALENCE (C(1334),FMH26)	A2	99
	EQUIVALENCE (C(1335),FMH27)	A2	100
	EQUIVALENCE (C(1336),FMH28)	A2	101
	EQUIVALENCE (C(1337),FMH29)	A2	102
	EQUIVALENCE (C(1338),FMH30)	A2	103
	EQUIVALENCE (C(1339),FMH31)	A2	104
	EQUIVALENCE (C(1340),FMH32)	A2	105
	EQUIVALENCE (C(1341),FMH33)	A2	106
	EQUIVALENCE (C(1342),FMH34)	A2	107
	EQUIVALENCE (C(1343),FMH35)	A2	108
	EQUIVALENCE (C(1344),FMH36)	A2	109
	EQUIVALENCE (C(1345),FMH37)	A2	110
	EQUIVALENCE (C(1346),FMH38)	A2	111
	EQUIVALENCE (C(1347),FMH39)	A2	112
	EQUIVALENCE (C(1348),FMH40)	A2	113
	EQUIVALENCE (C(1349),FMH41)	A2	114
	EQUIVALENCE (C(1350),FMH42)	A2	115
	EQUIVALENCE (C(1351),FMH43)	A2	116
	EQUIVALENCE (C(1352),FMH44)	A2	117
	EQUIVALENCE (C(1353),FMH45)	A2	118
	EQUIVALENCE (C(1354),FMH46)	A2	119
	EQUIVALENCE (C(1355),FMH47)	A2	120
	EQUIVALENCE (C(1356),FMH48)	A2	121
	EQUIVALENCE (C(1357),FMH49)	A2	122
	EQUIVALENCE (C(1358),FMH50)	A2	123
	EQUIVALENCE (C(1359),FMH51)	A2	124
	EQUIVALENCE (C(1360),FMH52)	A2	125
	EQUIVALENCE (C(1361),FMH53)	A2	126
	EQUIVALENCE (C(1362),FMH54)	A2	127
	EQUIVALENCE (C(1363),FMH55)	A2	128
	EQUIVALENCE (C(1364),FMH56)	A2	129
	EQUIVALENCE (C(1365),FMH57)	A2	130
	EQUIVALENCE (C(1366),FMH58)	A2	131
	EQUIVALENCE (C(1367),FMH59)	A2	132
	EQUIVALENCE (C(1368),FMH60)	A2	133
	EQUIVALENCE (C(1369),FMH61)	A2	134
	EQUIVALENCE (C(1370),FMH62)	A2	135
	EQUIVALENCE (C(1371),FMH63)	A2	136
	EQUIVALENCE (C(1372),FMH64)	A2	137
	EQUIVALENCE (C(1373),FMH65)	A2	138
	EQUIVALENCE (C(1374),FMH66)	A2	139
	EQUIVALENCE (C(1375),FMH67)	A2	140
	EQUIVALENCE (C(1376),FMH68)	A2	141
	EQUIVALENCE (C(1377),FMH69)	A2	142
	EQUIVALENCE (C(1378),FMH70)	A2	143
	EQUIVALENCE (C(1379),FMH71)	A2	144
	EQUIVALENCE (C(1380),FMH72)	A2	145
	EQUIVALENCE (C(1381),FMH73)	A2	146
	EQUIVALENCE (C(1382),FMH74)	A2	147
	EQUIVALENCE (C(1383),FMH75)	A2	148
	EQUIVALENCE (C(1384),FMH76)	A2	149
	EQUIVALENCE (C(1385),FMH77)	A2	150
	EQUIVALENCE (C(1386),FMH78)	A2	151
	EQUIVALENCE (C(1387),FMH79)	A2	152
	EQUIVALENCE (C(1388),FMH80)	A2	153
	EQUIVALENCE (C(1389),FMH81)	A2	154
	EQUIVALENCE (C(1390),FMH82)	A2	155
	EQUIVALENCE (C(1391),FMH83)	A2	156
	EQUIVALENCE (C(1392),FMH84)	A2	157
	EQUIVALENCE (C(1393),FMH85)	A2	158
	EQUIVALENCE (C(1394),FMH86)	A2	159
	EQUIVALENCE (C(1395),FMH87)	A2	160
	EQUIVALENCE (C(1396),FMH88)	A2	161
	EQUIVALENCE (C(1397),FMH89)	A2	162
	EQUIVALENCE (C(1398),FMH90)	A2	163
	EQUIVALENCE (C(1399),FMH91)	A2	164
	EQUIVALENCE (C(1400),FMH92)	A2	165
	EQUIVALENCE (C(1401),FMH93)	A2	166
	EQUIVALENCE (C(1402),FMH94)	A2	167
	EQUIVALENCE (C(1403),FMH95)	A2	168
	EQUIVALENCE (C(1404),FMH96)	A2	169
	EQUIVALENCE (C(1405),FMH97)	A2	170
	EQUIVALENCE (C(1406),FMH98)	A2	171
	EQUIVALENCE (C(1407),FMH99)	A2	172
	EQUIVALENCE (C(1408),FMH100)	A2	173
	EQUIVALENCE (C(1409),FMH101)	A2	174
	EQUIVALENCE (C(1410),FMH102)	A2	175
	EQUIVALENCE (C(1411),FMH103)	A2	176
	EQUIVALENCE (C(1412),FMH104)	A2	177
	EQUIVALENCE (C(1413),FMH105)	A2	178
	EQUIVALENCE (C(1414),FMH106)	A2	179
	EQUIVALENCE (C(1415),FMH107)	A2	180
	EQUIVALENCE (C(1416),FMH108)	A2	181
	EQUIVALENCE (C(1417),FMH109)	A2	182
	EQUIVALENCE (C(1418),FMH110)	A2	183
	EQUIVALENCE (C(1419),FMH111)	A2	184
	EQUIVALENCE (C(1420),FMH112)	A2	185
	EQUIVALENCE (C(1421),FMH113)	A2	186
	EQUIVALENCE (C(1422),FMH114)	A2	187
	EQUIVALENCE (C(1423),FMH115)	A2	188
	EQUIVALENCE (C(1424),FMH116)	A2	189
	EQUIVALENCE (C(1425),FMH117)	A2	190
	EQUIVALENCE (C(1426),FMH118)	A2	191
	EQUIVALENCE (C(1427),FMH119)	A2	192
	EQUIVALENCE (C(1428),FMH120)	A2	193
	EQUIVALENCE (C(1429),FMH121)	A2	194
	EQUIVALENCE (C(1430),FMH122)	A2	195
	EQUIVALENCE (C(1431),FMH123)	A2	196
	EQUIVALENCE (C(1432),FMH124)	A2	197
	EQUIVALENCE (C(1433),FMH125)	A2	198
	EQUIVALENCE (C(1434),FMH126)	A2	199
	EQUIVALENCE (C(1435),FMH127)	A2	200
	EQUIVALENCE (C(1436),FMH128)	A2	201
	EQUIVALENCE (C(1437),FMH129)	A2	202
	EQUIVALENCE (C(1438),FMH130)	A2	203
	EQUIVALENCE (C(1439),FMH131)	A2	204
	EQUIVALENCE (C(1440),FMH132)	A2	205
	EQUIVALENCE (C(1441),FMH133)	A2	206
	EQUIVALENCE (C(1442),FMH134)	A2	207
	EQUIVALENCE (C(1443),FMH135)	A2	208
	EQUIVALENCE (C(1444),FMH136)	A2	209
	EQUIVALENCE (C(1445),FMH137)	A2	210
	EQUIVALENCE (C(1446),FMH138)	A2	211
	EQUIVALENCE (C(1447),FMH139)	A2	212
	EQUIVALENCE (C(1448),FMH140)	A2	213
	EQUIVALENCE (C(1449),FMH141)	A2	214
	EQUIVALENCE (C(1450),FMH142)	A2	215
	EQUIVALENCE (C(1451),FMH143)	A2	216
	EQUIVALENCE (C(1452),FMH144)	A2	217
	EQUIVALENCE (C(1453),FMH145)	A2	218
	EQUIVALENCE (C(1454),FMH146)	A2	219
	EQUIVALENCE (C(1455),FMH147)	A2	220
	EQUIVALENCE (C(1456),FMH148)	A2	221
	EQUIVALENCE (C(1457),FMH149)	A2	222
	EQUIVALENCE (C(1458),FMH150)	A2	223
	EQUIVALENCE (C(1459),FMH151)	A2	224
	EQUIVALENCE (C(1460),FMH152)	A2	225
	EQUIVALENCE (C(1461),FMH153)	A2	226
	EQUIVALENCE (C(1462),FMH154)	A2	227
	EQUIVALENCE (C(1463),FMH155)	A2	228
	EQUIVALENCE (C(1464),FMH156)	A2	229
	EQUIVALENCE (C(1465),FMH157)	A2	230
	EQUIVALENCE (C(1466),FMH158)	A2	231
	EQUIVALENCE (C(1467),FMH159)	A2	232
	EQUIVALENCE (C(1468),FMH160)	A2	233
	EQUIVALENCE (C(1469),FMH161)	A2	234
	EQUIVALENCE (C(1470),FMH162)	A2	235
	EQUIVALENCE (C(1471),FMH163)	A2	236
	EQUIVALENCE (C(1472),FMH164)	A2	237
	EQUIVALENCE (C(1473),FMH165)	A2	238
	EQUIVALENCE (C(1474),FMH166)	A2	239
	EQUIVALENCE (C(1475),FMH167)	A2	240
	EQUIVALENCE (C(1476),FMH168)	A2	241
	EQUIVALENCE (C(1477),FMH169)	A2	242
	EQUIVALENCE (C(1478),FMH170)	A2	243
	EQUIVALENCE (C(1479),FMH171)	A2	244
	EQUIVALENCE (C(1480),FMH172)	A2	245
	EQUIVALENCE (C(1481),FMH173)	A2	246
	EQUIVALENCE (C(1482),FMH174)	A2	247
	EQUIVALENCE (C(1483),FMH175)	A2	248
	EQUIVALENCE (C(1484),FMH176)	A2	249
	EQUIVALENCE (C(1485),FMH177)	A2	250
	EQUIVALENCE (C(1486),FMH178)	A2	251
	EQUIVALENCE (C(1487),FMH179)	A2	252
	EQUIVALENCE (C(1488),FMH180)	A2	253
	EQUIVALENCE (C(1489),FMH181)	A2	254
	EQUIVALENCE (C(1490),FMH182)	A2	255
	EQUIVALENCE (C(1491),FMH183)	A2	256
	EQUIVALENCE (C(1492),FMH184)	A2	257
	EQUIVALENCE (C(1493),FMH185)	A2	258
	EQUIVALENCE (C(1494),FMH186)	A2	259
	EQUIVALENCE (C(1495),FMH187)	A2	260
	EQUIVALENCE (C(1496),FMH188)	A2	261
	EQUIVALENCE (C(1497),FMH189)	A2	262
	EQUIVALENCE (C(1498),FMH190)	A2	263
	EQUIVALENCE (C(1499),FMH191)	A2	264
	EQUIVALENCE (C(1500),FMH192)	A2	265
	EQUIVALENCE (C(1501),FMH193)	A2	266
	EQUIVALENCE (C(1502),FMH194)	A2	267
	EQUIVALENCE (C(1503),FMH195)	A2	268
	EQUIVALENCE (C(1504),FMH196)	A2	269
	EQUIVALENCE (C(1505),FMH197)	A2	270
	EQUIVALENCE (C(1506),FMH198)	A2	271
	EQUIVALENCE (C(1507),FMH199)	A2	272
	EQUIVALENCE (C(1508),FMH200)	A2	273
	EQUIVALENCE (C(1509),FMH201)	A2	274
	EQUIVALENCE (C(1510),FMH202)	A2	275
	EQUIVALENCE (C(1511),FMH203)	A2	276
	EQUIVALENCE (C(1512),FMH204)	A2	277
	EQUIVALENCE (C(1513),FMH205)	A2	278
	EQUIVALENCE (C(1514),FMH206)	A2	

```

115      IF(IISNDX(1)-E2.1743)CALL MCRLC(DUM,1,100)
116      IF(IISNDX(1)-E2.1747)CALL MCRLC(DUM,1,100)
117      CONTINUE
118      G(13) = 1.
119      WRITE(6,104)W2,W2,WR
120      FORMAT(1H-.50X,*,TIPOFF RATES=-ROLL = *F6.1,*,PITCH = *F6.1,
121      * * YAN = *F6.1)
122      FLG2 = 1.
123      WRITE(6,102) I,VAIRS,UFZL2
124      WRITE(6,103) -RANGO
125      103 FORMAT(32X,MZANGO = *F6.4)
126      102 -FORMAT(1H0,36H REAR LUG CLEARS RAIL - T = *F6.4,
127      * 10HREL VEL = *F8.3,16H RAIL FORCE = *F8.2)
128      GO TO 74
129      70 IF (RANGO .LE. RAIL) GO TO 72
130      RZDD=0.
131      FYLUG = -(FYBA + DMASS*AGRAI*(CFA23 + FYZBA*
132      * RLCG*DMASS/FMIZ)/I. + DMASS*RLCG*RLCG/FMIZ)
133      FZLUG = -(FZ3A + DMASS*AGRAI*(CFA33-RZDD) + FMYBA*
134      * RLCG*DMASS/FMIZ)/I. + DMASS*RLCG*RLCG/FMIZ)
135      FMXUG = - FMXBA
136      FMZUG = - FZLUG*RLCG
137      FMZLUG = FYLUG*RLCG
138      IF (FLG1 .GT. 0.) GO TO 74
139      FLG1 = 1.
140      WRITE(6,101) T,VAIRS,FMYLUG
141      WRITE(6,103) RANGO
142      GO TO 74
143      60 CONTINUE
144      60 CONTINUE
145      60 CONTINUE
146      60 CONTINUE
147      60 CONTINUE
148      60 CONTINUE
149      60 CONTINUE
150      60 CONTINUE
151      60 CONTINUE
152      60 CONTINUE
153      60 CONTINUE
154      60 CONTINUE
155      60 CONTINUE
156      60 CONTINUE
157      60 CONTINUE
158      60 CONTINUE
159      60 CONTINUE
160      60 CONTINUE
161      60 CONTINUE
162      60 CONTINUE
163      60 CONTINUE
164      60 CONTINUE
165      60 CONTINUE
166      60 CONTINUE
167      60 CONTINUE
168      60 CONTINUE
169      60 CONTINUE
170      60 CONTINUE
171      60 CONTINUE
172      60 CONTINUE

```


SYMBOLIC REFERENCE MAP (R=31)

ENTRY POINTS	DEF LINE	REFERENCES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000
VARIABLES	SM	TYPE	RELOCATION																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							

VARIABLES	SN	TYPE	RELOCATION	REFS	76	140	174	DEFINED	109	136	165
2453 FMYLUG	REAL	/	/	REFS	76	140	174	DEFINED	109	136	165
2450 FMYTH	REAL	/	/	REFS	39	94					
3320 FMZ	REAL	/	/	REFS	49	182	196	DEFINED	112		
2430 FMZBA	REAL	/	/	REFS	85	131	166		186		
				REFS	95	175	186				
2454 FMZLUG	REAL	/	/	DEFINED	95	175	DEFINED	110	137	156	
2451 FMZTH	REAL	/	/	REFS	79	175					
2602 FTMA	REAL	/	/	REFS	40	35					
2603 FTMY	REAL	/	/	REFS	41	86					
2604 FTMZ	REAL	/	/	REFS	42	87					
2423 FXBA	REAL	/	/	REFS	43	88					
2424 FYBA	REAL	/	/	REFS	60	DEFINED	86				
				REFS	51	95	131	162	171		
				DEFINED	57	171					
353 FYLUG	REAL	/	/	REFS	137	171	DEFINED	106	131	162	
2425 FZBA	REAL	/	/	REFS	52	94	133	163	172		
				DEFINED	88	172					
352 FZLUG	REAL	/	/	REFS	105	136	172	DEFINED	107	133	163
355 I	INTEGER	/	/	REFS	114	115	116	DEFINED	113		
7661 ISNDX	INTEGER	/	/	REFS	115	116	DEFINED	114			
6667 I3512	INTEGER	/	/	REFS	18	19	115				
6666 MPT	INTEGER	/	/	REFS	37	113					
6657 OPTN4	REAL	/	/	REFS	30	104					
312 P0YHMC	REAL	/	/	REFS	20	83					
2574 QBURN	REAL	/	/	REFS	14						
2444 RAIL	REAL	/	/	REFS	11	104	129				
573 RANGO	REAL	/	/	REFS	24	104	124	129	191		
2433 RUELCG	REAL	/	/	REFS	66	94	95				
2431 RFAREA	REAL	/	/	REFS	8	83					
2432 RFLGTH	REAL	/	/	REFS	9	94	32				
3663 RKUTTA	REAL	/	/	REFS	56						
2615 RLUG	REAL	/	/	REFS	44	3*131	3*133	136	137		
2443 RLUG	REAL	/	/	REFS	10	104					
360 RZOU	REAL	/	/	REFS	133	153	DEFINED	130	151		
3717 T	REAL	/	/	REFS	35	123	140	181	182		
351 UFZL2	REAL	/	/	REFS	123	DEFINED	105				
350 UL2V	REAL	/	/	REFS	33	94	95	DEFINED	91	92	
346 UQS	REAL	/	/	REFS	84	86	87	88	DEFINED	93	
347 UQSL	REAL	/	/	REFS	93	94	95	90	99	100	10E
				DEFINED	84						
316 VAIRSP	REAL	/	/	REFS	22	2*92	123	140			
1161 V18	REAL	/	/	REFS	54	150					
313 VMACH	REAL	/	/	REFS	21						
3312 MP	REAL	/	/	REFS	47	93	119				
3311 MPTO	REAL	/	/	REFS	52	153					
3316 MQ	REAL	/	/	REFS	48	94	119				
364 MQ0	* REAL	/	/	REFS	131						
3322 MR	REAL	/	/	REFS	50	95	119				
365 MR0	* REAL	/	/	REFS	192						

FILE NAMES	MODE	TAPE6	WRITES	119	123	124	140	141
EXTERNALS	TYPE	ARGS	REFERENCES					
LTRAN	7	3	181	182				
MCARLO			115	116				

STATEMENT LABELS	DEF LINE	REFERENCES
0 5	INACTIVE	154
0 6		117
113 70		123 104
156 72		129
174 74		159 111 128 130 159
214 75		183 173 180
246 101	FMT	4 143
315 102	FMT	125 123
312 103	FMT	125 124 141
267 104	FMT	120 119

LOOPS LABEL	INDEX	FROM-T3	LENGTH	PROPERTIES	EXT REFS
66 6	I	113 117	148		

COMMON BLOCKS	LENGTH	MEMBERS	BIAS NAME(LENGTH)
/ /	3830		0 0 (3830)

EQUIV CLASSES	LENGTH	MEMBERS	BIAS NAME(LENGTH)
C C	3830		
		202 POWNC (1)	203 V4ACH (1)
		343 RTAT (1)	379 RANGC (1)
		1202 CX (1)	1203 CV (1)
		1205 CLP (1)	1205 CM2 (1)
		1208 C (1)	1209 C1 (1)
		1235 CH1 (1)	1235 CH2 (1)
		1238 CH4 (1)	1293 EX3A (1)
		1301 F234 (1)	1302 FM4DA (1)
		1304 F428A (1)	1305 RF43EA (1)
		1307 J2ELC5 (1)	1308 FM41 (1)
		1310 F473 (1)	1311 FM44 (1)
		1316 RAIL (1)	1313 FM4T4 (1)
		1321 F42TH (1)	1322 FM4LUG (1)
		1324 FM4LUG (1)	1331 CP4AS (1)
		1410 FTHX (1)	1411 FTHY (1)
		1421 KLC6 (1)	1625 ASRAV (1)
		1722 CF423 (1)	1714 CF433 (1)
		1737 WPT0 (1)	1738 WP (1)
		1741 AMP2 (1)	1742 W2 (1)
		1745 AMP1 (1)	1745 W2 (1)
		1749 F417 (1)	1749 F412 (1)
		1371 RKUTTA (1)	1974 NPT (1)
		3503 OPTN4 (1)	3511 I3512 (1)
			206 VAIRSP (1)
			625 VIB (1)
			1204 CZ (1)
			1207 CNR (1)
			1210 CN (1)
			1237 CH3 (1)
			1300 FY8A (1)
			1303 FMY8A (1)
			1306 RFLGTH (1)
			1309 FM42 (1)
			1315 RLUG (1)
			1320 FMYTH (1)
			1323 F4TLUG (1)
			1604 OBURN (1)
			1412 FTHZ (1)
			1627 DMAS (1)
			1736 FMX (1)
			1740 FMY (1)
			1744 FMZ (1)
			1747 FMIX (1)
			1750 CRAU (1)
			1999 T (1)
			3533 ISNDK (40)

STATISTICS	PROGRAM LENGTH	CH BLANK COMMON LENGTH
	3663	73668
	246	3830

SUBROUTINE LTRAN(IT,DELT,AMP,Y,YC,IFLS,K)
 DIMENSION A(5,3),PH(15,3),M(5,3)

DATA INAX,AE/4,-1./

DATA (A(I,1),I=1,5)/1.,.5/1.,.5,.,12.,.26.,.0./

DATA (A(I,2),I=1,5)/1.,.5/1.,.5,.,12.,.26.,.0./

DATA (A(I,3),I=1,5)/1.,.5/1.,.5,.,12.,.26.,.0./

IF(IFLG.GT.0)GO TO 17

ZC=0.

M1=5.2E-11.

DO 1 I=1,IMAX

CALL RANJND(0.,RNSTAT,RN)

M(I,K)=3.14*RN

M(I,K)=I*M1

C-ZC IS INTEGRATION CONSTANT FOR Z

B=M(I,K)*T*PH(I,K)

ZC=ZC+ A(I,K)*IAE*SIN(B)-M(I,K)*COS(B)/(IAE**2+I,K)**2)

1 CONTINUE

YC=AMP*EXP(IAE*T)*ZC

17 CONTINUE

Z=0.

DO 2 I=1,IMAX

Z=Z+A(I,K)*SIN(M(I,K)*T*PH(I,K))

2 CONTINUE

Y=AMP*EXP(IAE*T)*Z

RETURN

END

LTRN 2
 LTRN 3
 LTRN 4
 LTRN 5
 LTRN 6
 LTRN 7
 LTRN 8
 LTRN 9
 LTRN 10
 LTRN 11
 LTRN 12
 LTRN 13
 LTRN 14
 LTRN 15
 LTRN 16
 LTRN 17
 LTRN 18
 LTRN 19
 LTRN 20
 LTRN 21
 LTRN 22
 LTRN 23
 LTRN 24
 LTRN 25
 LTRN 26
 LTRN 27


```

SUBROUTINE D11
  ** SUBROUTINE D11
  COMMON C(3030)
  EQUIVALENCE (C(2551),M)
  EQUIVALENCE (C(2562),IPL)
  DIMENSION IPL(100), ISNOX(4), ITNOX(10)
  EQUIVALENCE (C(3634), ISNOX), (C(3512), I3512)

  C
  C** INPUT DATA
  EQUIVALENCE (C(1001),VHXE)
  EQUIVALENCE (C(1011),VHTE)
  EQUIVALENCE (C(1021),VHZE)
  EQUIVALENCE (C(1204),VHAC4)
  EQUIVALENCE (C(1371),BALPHA)
  EQUIVALENCE (C(1607),BALP4V)
  EQUIVALENCE (C(1427),BTHIC)
  EQUIVALENCE (C(1431),BPSIG)
  EQUIVALENCE (C(1639),OPTARG)
  EQUIVALENCE (C(1655),BLOS4)
  EQUIVALENCE (C(1657),KSLANT)
  EQUIVALENCE (C(1174),VHTE)
  EQUIVALENCE (C(1175),CRAD)
  EQUIVALENCE (C(3502),OPTN2)
  EQUIVALENCE (C(3504),OPTN4)
  EQUIVALENCE (C(3535),OPTN6)

  C
  C** OUTPUT TO MODULES
  EQUIVALENCE (C(1615),RXE)
  EQUIVALENCE (C(1613),RYE)
  EQUIVALENCE (C(1623),RZE)
  EQUIVALENCE (C(1603),VXE)
  EQUIVALENCE (C(1607),VYE)
  EQUIVALENCE (C(1511),VZE)
  EQUIVALENCE (C(1651),RTXE)
  EQUIVALENCE (C(1655),RTYE)
  EQUIVALENCE (C(1659),RTZE)
  EQUIVALENCE (C(1556),RXO)
  EQUIVALENCE (C(1631),RYO)
  EQUIVALENCE (C(1573),RZO)
  EQUIVALENCE (C(1571),VXO)
  EQUIVALENCE (C(1572),VYO)
  EQUIVALENCE (C(1573),VZO)
  EQUIVALENCE (C(1752),BPHIO)
  EQUIVALENCE (C(1733),BTHIO)
  EQUIVALENCE (C(1754),BPSIO)
  EQUIVALENCE (C(1555),RHZRO)
  EQUIVALENCE (C(1635),ROELX)
  EQUIVALENCE (C(1536),ROELY)
  EQUIVALENCE (C(1537),ROELZ)
  EQUIVALENCE (C(1561),RSJYMO)
  EQUIVALENCE (C(1551),RSJZMO)
  EQUIVALENCE (C(1753),ITNOX), (C(3723),IT37)
  EQUIVALENCE (C(1751),A013)
  EQUIVALENCE (C(1752),A012)
  EQUIVALENCE (C(1753),A013)
  EQUIVALENCE (C(1755),A021)
  EQUIVALENCE (C(1756),A022)

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Line	Code	Text	Column	Value
59		EQUIVALENCE (C(1757), A023)	01	59
60		EQUIVALENCE (C(1758), A031)	01	60
61		EQUIVALENCE (C(1759), A032)	01	61
62		EQUIVALENCE (C(1750), A033)	01	62
63		EQUIVALENCE (C(1764), P1)	01	63
64		EQUIVALENCE (C(1765), Q1)	01	64
65		EQUIVALENCE (C(1766), P2)	01	65
66		EQUIVALENCE (C(1757), R2)	01	66
67		EQUIVALENCE (C(1768), X001)	01	67
68		EQUIVALENCE (C(1759), Y001)	01	68
69		EQUIVALENCE (C(1770), Z001)	01	69
70		EQUIVALENCE (C(1771), X002)	01	70
71		EQUIVALENCE (C(1772), Y002)	01	71
72		EQUIVALENCE (C(1773), Z002)	01	72
73		EQUIVALENCE (C(1773), BPHIER)	01	73
74		EQUIVALENCE (C(1751), BTHZER)	01	74
75		EQUIVALENCE (C(1762), BPSIER)	01	75
76		EQUIVALENCE (C(1562), GSPJTY)	01	76
77		EQUIVALENCE (C(1572), GSPJTY)	01	77
78		EQUIVALENCE (C(1581), SIGSPOT)	01	78
79		EQUIVALENCE (C(1579), ZET1)	01	79
80		EQUIVALENCE (C(1580), M)	01	80
81			01	81
82			01	82
83		C* ZERO OUT SPOT JITTER MAX/MIN STORAGE LOCATIONS THAT ARE SAVED IN OUTP	01	83
84		C(1567) = 0.	01	84
85		C(1568) = 0.	01	85
86		C(1577) = 0.	01	86
87		C(1578) = 3.	01	87
88		C PRINTED FROM MODULE 54	01	88
89		M0 = 3.94	01	89
90		ZETA = .745	01	90
91			01	91
92		C SPOT JITTER MONTE CARLO INITIAL VALUES	01	92
93			01	93
94		RSJYMC = 0.	01	94
95		RSJZMC = 0.	01	95
96		DO 500 IOL=1, IOLC	01	96
97		ITSNOX = IOL	01	97
98		IF(IITNCK(IOL), NE, 1500) GO TO 502	01	98
99		IPL(N)=1500	01	99
100		IPL(N+1)=1503	01	100
101		N=N+2	01	101
102		IF(SIGSPOT, NE, 0.)	01	102
103		1 GSPOT = .737 * SIGSPOT / SQRT (M0 / 4. / ZETA * C(2664))	01	103
104		CALL MCARLO(RNSTRT, 4, ITSNOX)	01	104
105		502 IF(IITNCK(IOL), NE, 1501) GO TO 500	01	105
106		IPL(N)=1570	01	106
107		IPL(N+1)=1573	01	107
108		N=N+2	01	108
109		IF(SIGSPOT, NE, 0.)	01	109
110		1 GSPOT = .737 * SIGSPOT / SQRT (M0 / 4. / ZETA * C(2664))	01	110
111		CALL MCARLO(RNSTRT, 4, ITSNOX)	01	111
112		500 CONTINUE	01	112
113			01	113
114			01	114
115		IPL(N) = 1630	01	115
116		IPL(N+1) = 1634	01	116

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115      IPL(N+2) = 1618      01      116
      IPL(N+3) = 1612      01      117
      IPL(N+4) = 1616      01      118
      IPL(N+5) = 1620      01      119
      IPL(N+6) = 1640      01      120
      IPL(N+7) = 1644      01      121
      IPL(N+8) = 1648      01      122
      IPL(N+9) = 1652      01      123
      IPL(N+10) = 1656      01      124
      N = N+11      01      125
      C( 363) = 0.      01      126
      C( 364) = 0.      01      127
      CRA = 57.295778      01      128
C
      IF (OPTN2.LE.0.) RETJRN      01      129
      IF (OPTN3.LE.0.) N = N-5      01      130
C
C**CALCULATE MISSILE PARAMETER INITIAL CONDITIONS
      RYE=0.      01      131
      RTVE = 0.      01      132
      RTVE = 0.      01      133
      RTVE = 0.      01      134
      RYX = 0.      01      135
      RYX = 0.      01      136
      RYX = 0.      01      137
      RYX = 0.      01      138
      RYX = 0.      01      139
      RYX = 0.      01      140
      RYX = 0.      01      141
      RYX = 0.      01      142
      RYX = 0.      01      143
      RYX = 0.      01      144
      RYX = 0.      01      145
      RYX = 0.      01      146
      RYX = 0.      01      147
      RYX = 0.      01      148
      RYX = 0.      01      149
      RYX = 0.      01      150
      RYX = 0.      01      151
      RYX = 0.      01      152
      RYX = 0.      01      153
      RYX = 0.      01      154
      RYX = 0.      01      155
      RYX = 0.      01      156
      RYX = 0.      01      157
      RYX = 0.      01      158
      RYX = 0.      01      159
      RYX = 0.      01      160
      RYX = 0.      01      161
      RYX = 0.      01      162
      RYX = 0.      01      163
      RYX = 0.      01      164
      RYX = 0.      01      165
      RYX = 0.      01      166
      RYX = 0.      01      167
      RYX = 0.      01      168
      RYX = 0.      01      169
      RYX = 0.      01      170
      RYX = 0.      01      171
      RYX = 0.      01      172

```

```

C
USP411 = SIND(BPHIO + BPH1E1)
UCPH11 = COSD(BPHIO + BPH1E1)
175  USHT2 = SIND(BHTO + BHT2E1)
UCHT2 = COSD(BHTO + BHT2E1)
USP11 = SIND(BPSIO + BPS1E1)
UCP11 = COSD(BPSIO + BPS1E1)
180  A011 = USP11*UCHT2
A012 = USP11*UCHT2
A013 = -USHT2
A021 = -USP11*UCP11 + UCP11*USHT2*USPH11
A022 = USP11*UCPH11 + USP11*USHT2*USPH11
A023 = UCT4T2*JSPH11
185  A031 = UCP11*USHT2*UCPH11 + USP11*USPH11
A032 = USP11*USHT2*UCPH11 - UCP11*USPH11
A033 = UCT4T2*UCP11

C
C MISSILE INITIAL ATTITUDE ERRORS
C
00 5 I = 1, 13512
100 = 1
IF (ISNOX(I).EQ.1732) CALL M2ARLO (OUM, 1, IDO)
195  IF (ISNOX(I).EQ.1753) CALL M2ARLO (OUM, 1, IDO)
IF (ISNOX(I).EQ.1754) CALL M2ARLO (OUM, 1, IDO)
5 CONTINUE

C
IF (OPTN2.GT.1.0) GO TO 10
200  RXE = RSLANT*CSJ(BLOS)
RZE = RSLANT*SIND(BLOS)
GO TO 20
10 RSLANT = SRT(RZE**2 + RXE**2)
20 RH = R420 - RZE

C
IF (OPTN4.GT.0) GO TO 30
BPSIO = CRAD*ASIN(SIND(BPSI))*RSLANT/RXE
CPSIO = COSD(BPSIO)
JTHIG = SIND(BHTG)/COSD(BHTG)
BHTO = ATAND((-RZE/RXE - JTHIG*CPSIO), (CPSIO - JTHIG*RZE/RXE))
GO TO 40
30 CONTINUE
IF (OPTN4.GT.1) GO TO 40
UST = SIND(BHTO)
USP = SIND(BPSIO)
UCP = COSD(BPSIO)
UCT = COSD(BHTO)
UCPH = COSD(BPHIO)
USPH = SIND(BPHIO)
220  RXBA = -RXE*UCP*UST + RZE*UST
RIBA = -RXE*(UCP*USP - USP*UCPH) - RZE*UCT*JSPH
RZBA = -RXE*(UCP*UST*UCPH + USP*USPH) - RZE*UCT*UCPH
BTHIG = ATAND(-RZBA/RIBA)
BPSIG = ATAND(RYBA, (RXBA*CSJD(BHTIG) - RZBA*SINJ(BHTIG)))
40 CONTINUE

C
24  VSOUNO = 1117.3 - .00342*RH
IF (OPTN5.LE.0) WHITE = /MACH*VSOUNO

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230      C      VMXY = VMTE*CO5D(BALPHA - BTHTO)
          VXE = VXE + VMXY*CO5D(BALPHA - BTHTO)
          VYE = VYE + VMXY*SIND(BALPHA - BTHTO)
          VZE = VZE + VMXY*SIND(BALPHA - BTHTO)
235      RXO = RXE
          RYO = RYE
          RZO = RZE
          VXO = VXE
          VYO = VYE
          VZO = VZE
240      RDELX = RXE - RYE
          RDELY = RYE - RZE
          RDELZ = RZE - RZE
          RETURN
245      END
    
```

CARD NR. SEVERITY DETAILS DIAGNOSIS OF PROBLEM

98	I	ITCT	THIS STATEMENT MAY REDEFINE A CURRENT LOOP CONTROL VARIABLE OR PARAMETER.
99	I	ITCT	THIS STATEMENT MAY REDEFINE A CURRENT LOOP CONTROL VARIABLE OR PARAMETER.
105	I	ITCT	THIS STATEMENT MAY REDEFINE A CURRENT LOOP CONTROL VARIABLE OR PARAMETER.
106	I	ITCT	THIS STATEMENT MAY REDEFINE A CURRENT LOOP CONTROL VARIABLE OR PARAMETER.

VARIABLES	SN	TYPE	RELOCATION	REFS	52	95	97	104	105	106	107
7210 ICT	INTEGER	ARRAY	REFS	52	95	97	104				
7250 IINDX	INTEGER	REFS	REFS	52	110	DEFINED	96				
523 IISNOX	INTEGER	REFS	REFS	133	150	154	192				
6667 IIS12	INTEGER	REFS	REFS	7	98	99	100	105	106	107	
5800 N	INTEGER	REFS	REFS	4	115	116	117	118	119	120	
		REFS	REFS	114	123	124	130	DEFINED	100	107	
		REFS	REFS	121	122						
		REFS	REFS	124	130						
3146 OPTARG	REAL	REFS	REFS	16	130						
6655 OPIN2	REAL	REFS	REFS	23	129	139					
6657 OPIN4	REAL	REFS	REFS	24	206	213					
6661 OPTNG	REAL	REFS	REFS	25	226						
3343 P1	REAL	REFS	REFS	32	DEFINED	146					
3345 P2	REAL	REFS	REFS	34	DEFINED	148					
3344 Q1	REAL	REFS	REFS	53	DEFINED	147					
3142 ROELN	REAL	REFS	REFS	47	DEFINED	241					
3143 ROELY	REAL	REFS	REFS	48	DEFINED	242					
3144 RDELZ	REAL	REFS	REFS	49	DEFINED	243					
536 RH	REAL	REFS	REFS	227	DEFINED	204					
3200 RMZRO	REAL	REFS	REFS	46	204						
524 RNSRT	REAL	REFS	REFS	103	110						
3217 RSJYMC	REAL	REFS	REFS	30	DEFINED	93					
3220 RSJZMC	REAL	REFS	REFS	31	DEFINED	94					
3262 RSLANT	REAL	REFS	REFS	20	200	201	207	DEFINED	203		
3162 RTXE	REAL	REFS	REFS	34	241	DEFINED	136				
3166 RTYE	REAL	REFS	REFS	35	242	DEFINED	135				
3172 RTZE	REAL	REFS	REFS	36	243	DEFINED	134				
547 RXBA	REAL	REFS	REFS	223	224	DEFINED	220				
3116 RXE	REAL	REFS	REFS	26	203	207	2*210	220	221	222	
		REFS	REFS	241	DEFINED	200					
3203 RXO	REAL	REFS	REFS	37	DEFINED	235					
550 RYBA	REAL	REFS	REFS	224	DEFINED	221					
3122 RYE	REAL	REFS	REFS	29	236	242	DEFINED	133			
3204 RYO	REAL	REFS	REFS	38	DEFINED	236					
551 RZBA	REAL	REFS	REFS	223	224	DEFINED	222				
3126 RZE	REAL	REFS	REFS	30	203	204	2*210	220	221	222	
		REFS	REFS	243	DEFINED	201					
3205 RZO	REAL	REFS	REFS	39	DEFINED	237					
3346 R2	REAL	REFS	REFS	65	DEFINED	149					
3054 SIGSPOT	REAL	REFS	REFS	77	2*101	2*108					
540 TITATG	REAL	REFS	REFS	2*210	DEFINED	209					
543 UCP	REAL	REFS	REFS	220	221	222	DEFINED	216			
545 UCPH	REAL	REFS	REFS	221	2*222	DEFINED	218				
531 UCPH11	REAL	REFS	REFS	132	183	185	186	187			
		DEFINED	DEFINED	174							
535 UCPS11	REAL	REFS	REFS	179	182	183	185	186			
		DEFINED	DEFINED	176							
544 UCT	REAL	REFS	REFS	220	221	222	DEFINED	217			
533 UCTHT2	REAL	REFS	REFS	179	180	184	187	DEFINED	176		
542 USP	REAL	REFS	REFS	221	222	DEFINED	215				
546 USPH	REAL	REFS	REFS	2*221	222	DEFINED	219				
530 USPH11	REAL	REFS	REFS	132	183	184	185				
		DEFINED	DEFINED	173							
534 USPS11	REAL	REFS	REFS	190	182	183	185	186			
		DEFINED	DEFINED	177							
541 UST	REAL	REFS	REFS	220	221	222	DEFINED	214			
532 USHT2	REAL	REFS	REFS	191	182	183	185				

SUBROUTINE D11 74/74 DPT=1

VARIABLES	SN	TYPE	RELOCATION	DEFINED
313 VMACH	REAL	1	1	175
3211 VMITE	REAL	1	1	13
553 VMXY	REAL	1	1	21
552 VSOUND	REAL	1	1	231
143 VMXE	REAL	1	1	228
144 VMYE	REAL	1	1	10
145 VMZE	REAL	1	1	232
3102 VXE	REAL	1	1	11
3206 VXO	REAL	1	1	233
3106 VYE	REAL	1	1	238
3207 VYO	REAL	1	1	230
3112 VZE	REAL	1	1	239
3210 VZO	REAL	1	1	240
3053 W0	REAL	1	1	108
3347 X801	REAL	1	1	101
3352 X802	REAL	1	1	138
3350 Y801	REAL	1	1	141
3353 Y802	REAL	1	1	139
3351 Z801	REAL	1	1	142
3354 Z802	REAL	1	1	143
3052 ZETA	REAL	1	1	143
				101
				138
				89

EXTERNALS	TYPE	ARGS	REFERENCES
ASIN	REAL	1	207
ATAND	REAL	2	213
COSD	REAL	1	174
			224
MCARLO		3	224
			103
			194
SIND	REAL	1	173
			224
SQRT	REAL	1	101
			108

STATEMENT LABELS	DEF LINE	REFERENCES
0 5	197	192
267 10	203	199
0 11	159	164
273 20	204	202
0 24	INACTIVE	227
322 30	212	205
375 40	225	211
51 500	111	95
31 502	104	97
0 503	156	150

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES
11	500	* IOL	95 111	438	EXT REFS
117	503	* I	150 156	248	EXT REFS
146	11	* I	164 169	208	EXT REFS
237	5	* I	192 197	208	EXT REFS
COMMON BLOCKS					
/ /					
MEMBERS - BIAS NAME(LENGTH)					
/ /					
3830					
0 0 (3830)					

EQUIV-CLASSES		MEMBERS		B115 NAME(LEN:TM)	
C	LENGTH	C	LENGTH		
99	VMKE (1)	100	VMKE (1)	101	VMZE (1)
203	VMCH (1)	359	BPH1ER (1)	360	BTHZER (1)
361	PSIER (1)	365	BA-PHA (1)	367	BALPAY (1)
426	BTHIG (1)	430	SPSIG (1)	1581	GSPOTY (1)
1371	GSPOTZ (1)	1578	ZETA (1)	1579	W0 (1)
1580	S13SPOT (1)	1632	VXE (1)	1606	VVE (1)
1610	VZE (1)	1614	RXE (1)	1618	RVE (1)
1622	NZE (1)	1634	RDELX (1)	1635	RDELY (1)
1535	QDELZ (1)	1639	OPTARG (1)	1650	RIXE (1)
1554	TVIE (1)	1638	RIZE (1)	1664	RHZRO (1)
1665	DLUSV (1)	1655	RS-ANT (1)	1667	RXJ (1)
1668	MYD (1)	1659	RZJ (1)	1670	VXJ (1)
1671	VYJ (1)	1672	VZJ (1)	1673	VHYTE (1)
1673	QSJMC (1)	1680	RSJZMC (1)	1750	GRAO (1)
1751	BP410 (1)	1752	BT-TO (1)	1753	BPS1J (1)
1754	AJ21 (1)	1755	A022 (1)	1756	A023 (1)
1757	A031 (1)	1759	A032 (1)	1759	A033 (1)
1760	A011 (1)	1761	A012 (1)	1762	A013 (1)
1763	P1 (1)	1764	Q1 (1)	1765	P2 (1)
1765	Q2 (1)	1767	X001 (1)	1768	Y001 (1)
1769	Z001 (1)	1770	X002 (1)	1771	Y002 (1)
1772	Z002 (1)	2553	N (1)	2561	IPL (100)
3501	ON142 (1)	3503	OPTN4 (1)	3505	OPTN5 (1)
3511	IS-12 (1)	3633	ISNOX (40)	3720	1151 (1)
3752	1140X (10)				

STATISTICS

PROGRAM-LENGTH 5543 354
CM BLANK CANYON LENGTH 73653 3030

SUBROUTINE 01		SUBROUTINE 01	
C**TRANSLATIONAL DYNAMICS MODULE		COMMON C(3830)	
C		C**INPUT DATA	
5	EQUIVALENCE (C(1527),ACRAV)		247
	EQUIVALENCE (C(1528),DMASS)		248
	EQUIVALENCE (C(1529),ATHRST)		249
	EQUIVALENCE (C(1530),ATURNI)		250
	EQUIVALENCE (C(1531),BGANT)		251
10	EQUIVALENCE (C(1532),OPTARG)		252
	EQUIVALENCE (C(1533),ADIVE)		253
	EQUIVALENCE (C(1534),GRAD)		254
C		C**INPUTS FROM OTHER MODULES	
15	EQUIVALENCE (C(1300),FXBA)		255
	EQUIVALENCE (C(1301),FYBA)		256
	EQUIVALENCE (C(1302),FZBA)		257
	EQUIVALENCE (C(1703),CFA11)		258
20	EQUIVALENCE (C(1707),CFA12)		259
	EQUIVALENCE (C(1711),CFA13)		260
	EQUIVALENCE (C(1715),CFA21)		261
	EQUIVALENCE (C(1719),CFA22)		262
	EQUIVALENCE (C(1723),CFA23)		263
25	EQUIVALENCE (C(1727),CFA31)		264
	EQUIVALENCE (C(1731),CFA32)		265
	EQUIVALENCE (C(1735),CFA33)		266
	EQUIVALENCE (C(2000),I)		267
C		C**STATE VARIABLE OUTPUTS	
30	EQUIVALENCE (C(1600),VXED)		268
	EQUIVALENCE (C(1603),VXE)		269
	EQUIVALENCE (C(1604),VYED)		270
35	EQUIVALENCE (C(1607),VYE)		271
	EQUIVALENCE (C(1608),VZED)		272
	EQUIVALENCE (C(1611),VZE)		273
	EQUIVALENCE (C(1612),RXE)		274
	EQUIVALENCE (C(1615),RXE)		275
	EQUIVALENCE (C(1616),RYE)		276
40	EQUIVALENCE (C(1619),RYE)		277
	EQUIVALENCE (C(1620),RZE)		278
	EQUIVALENCE (C(1623),RZE)		279
	EQUIVALENCE (C(1640),VTARGO)		280
	EQUIVALENCE (C(1643),VTARG)		281
45	EQUIVALENCE (C(1644),BPSITO)		282
	EQUIVALENCE (C(1647),BPSIT)		283
	EQUIVALENCE (C(1648),RTXED)		284
	EQUIVALENCE (C(1651),RTXE)		285
50	EQUIVALENCE (C(1552),RTYED)		286
	EQUIVALENCE (C(1555),RTYE)		287
	EQUIVALENCE (C(1659),RTZED)		288
	EQUIVALENCE (C(1653),RTZE)		289
C		C**OTHER OUTPUTS	
55	EQUIVALENCE (C(1624),AXBA)		290
	EQUIVALENCE (C(1625),AYBA)		291
	EQUIVALENCE (C(1526),AZBA)		292
			293
			294
			295
			296
			297
			298
			299
			300
			301
			302
			303

115		R1YED = V1YE	01	361
		R1ZED = V1ZE	01	362
	C		01	363
		VOELX = V1XE-V1E	01	364
		VOELY = V1YE-V1E	01	365
120		VOELZ = V1ZE-V1E	01	366
	C		01	367
		VCLSNQ = 13OELX*VOELX+ROELX*VOELX+ROELZ*VOELZ/RANGE	01	368
		RETJRN	01	369
		END	01	370

SYMBOLIC REFERENCE MAP (2=3)

ENTRY POINTS	DEF LINE	REFERENCES	
1-01	1	105-123	
VARIABLES	SM TYPE	RELOCATION	
3220 ADIVE	REAL	12 REFS	
3132 AGRV	REAL	6 REFS	
3213 ANGX	REAL	71 REFS	106
3214 ANGY	REAL	72 REFS	95
3215 ANZ	REAL	73 REFS	96
3134 ATIRST	REAL	8 REFS	97
3135 ATIRST	REAL	9 REFS	106
3127 AXBA	REAL	82 REFS	108
3130 AXE	REAL	37 REFS	83
3130 AYBA	REAL	56 REFS	82
3131 AYE	REAL	80 REFS	83
3131 AZBA	REAL	57 REFS	82
3132 AZE	REAL	59 REFS	84
3136 BGAMT	REAL	10 REFS	112
3156 BPSIT	REAL	46 REFS	111
3153 BPSITD	REAL	45 REFS	107
0 C	REAL	3 REFS	100
	ARRAY	13 REFS	7
		22 REFS	6
		32 REFS	16
		40 REFS	17
		48 REFS	18
		50 REFS	19
		56 REFS	20
		66 REFS	21
		74 REFS	22
		19 REFS	23
		20 REFS	24
		21 REFS	25
		22 REFS	26
		23 REFS	27
		24 REFS	28
		25 REFS	29
		26 REFS	30
		27 REFS	31
		28 REFS	32
		29 REFS	33
		30 REFS	34
		31 REFS	35
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		373 REFS</	

RELOCATION.

[illegible]

REFERENCES

2°110	111
111	112

DEF LINE ... REFERENCES
160

MEMBERS - BIAS NAME(LENGTH)
32 (3836)

MEMBERS - BIOS NAME(LENGTH)
970 RANZE (1)
101 F23A (1)
103 VYED (1)
104 VZE (1)
105 VYED (1)
1022 RZE (1)
1025 A23A (1)
1020 ATRSL (1)
1031 VJELX (1)
1034 KOELX (1)
1037 VCLSNJ (1)
1042 VTRG (1)
1047 RIXED (1)
1054 RIVE (1)
1059 VIXE (1)
1062 VJX8 (1)
1075 ANSX (1)
1080 ADIVE (1)
110 UFA13 (1)
1222 CFA23 (1)
1734 CFA33 (1)

SUBROUTINE 01	24/74	OPT=1	FTN 4.2+75067	05/15/75	16.17.37.	PAGE 8
STATISTICS						
PROGRAM LENGTH	1333	31				
CH-BANK-COMMON-LENGTH	73663	3030				

```

SUBROUTINE 021
C**ROTATIONAL DYNAMICS: INITIALIZATION MODULE 02IEUL
COMMON C(3530)
DIMENSION IPL(100)

5  C**INPUT DATA
   EQUIVALENCE (C(1752),BPHIO)
   EQUIVALENCE (C(1753),BTHTO)
   EQUIVALENCE (C(1754),BFSIO)
C**INPUTS FROM MAIN PROGRAM
10  EQUIVALENCE (C(2561),N)
   EQUIVALENCE (C(2562),IPL)
C**STATE VARIABLE CJT*JTS
   EQUIVALENCE (C(1703),CFA11)
   EQUIVALENCE (C(1707),CFA12)
   EQUIVALENCE (C(1711),CFA13)
15  EQUIVALENCE (C(1715),CFA21)
   EQUIVALENCE (C(1719),CFA22)
   EQUIVALENCE (C(1723),CFA23)
   EQUIVALENCE (C(1727),CFA31)
   EQUIVALENCE (C(1731),CFA32)
   EQUIVALENCE (C(1735),CFA33)
20  C**OTHER OUTPUTS
   EQUIVALENCE (C(1755),A021)
   EQUIVALENCE (C(1755),A022)
   EQUIVALENCE (C(1757),A023)
25  EQUIVALENCE (C(1758),A031)
   EQUIVALENCE (C(1759),A032)
   EQUIVALENCE (C(1760),A033)
C**INITIAL CALCULATION OF EULER ANGLE MATRIX OF DIRECTION COSINES (CFA)
30  USP-I = SINJ(3P4IC)
   UCPHI = COSJ(8PHIC)
   USTHT = SINJ(3T4IC)
   UGTHI = COSJ(8THIC)
   USPSI = SINJ(8PSIC)
   UCPSI = COSJ(8PSIC)
35  CFA11 = UCPST*UGTHI
   CFA12 = USPSI*UGTHI
   CFA13 = -USTHT
   CFA21 = -USPSI*JCP-I*UCPSI*JSTHT*USP-I
   CFA22 = UCPSI*UCP-I*JSPSI*USTHT*USPHI
   CFA23 = UGTHI*JSPHI
   CFA31 = UCPSI*USTHT*UCPHI+USPSI*USPHI
   CFA32 = USPSI*USTHT*UCPHI-UCPSI*USPHI
   CFA33 = UGTHI*UCPHI
45  C
   C**INITIALIZE MATRIX UDEF FOR FREE GYRO MODEL(SI)
C
C**INTEGRATED PARAMETER LIST (IPL FOR WPO,WQ,WRO,AND CFAO)
   IPL(N) = 1730
   IPL(N+1) = 1734
   IPL(N+2) = 1708
   IPL(N+3) = 1722
   IPL(N+4) = 1716
   IPL(N+5) = 1720
   IPL(N+6) = 1724
   IPL(N+7) = 1728
   IPL(N+8) = 1732

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SUBROUTINE D2I		7474	OPT=1	FIN 4.2475067	95/05/75	16.17.40.	PAGE	2
	IPL(N+9) = 1736				01	428		
60	IPL(N+10) = 1740				01	429		
	IPL(N+11) = 1744				01	430		
	N = N+12				01	431		
	RETURN				01	432		
	END				01	433		

SYMBOLIC REFERENCE MAP (R=31)

ENTRY POINTS	DEF LINE	REFERENCES
1 DZL	1	62
VARIABLES SN TYPE RELOCATION		
332 A021	REAL	REFS 23
333 A022	REAL	REFS 24
334 A023	REAL	REFS 25
335 A031	REAL	REFS 26
336 A032	REAL	REFS 27
337 A033	REAL	REFS 28
337 BPHO	REAL	30 31
331 BPSIO	REAL	34 25
330 BPHO	REAL	32 33
0 C	REAL	6 7 8 10 11 13 15 16 17 18 19 20 21 22 23 24 25 26 27 28
3246 CFA11	REAL	11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
3252 CFA12	REAL	11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
3256 CFA13	REAL	11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
3262 CFA21	REAL	11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
3266 CFA22	REAL	11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
3272 CFA23	REAL	11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
3276 CFA31	REAL	11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
3302 CFA32	REAL	11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
3306 CFA33	REAL	11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
5001 IPL	INTEGER	11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
5000 N	INTEGER	11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
73 UCPHI	REAL	11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
77 UCPSI	REAL	11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
75 UCTHI	REAL	11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
72 USPHI	REAL	11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
76 USPSI	REAL	11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
74 USTHI	REAL	11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
EXTERNALS TYPE ARGS REFERENCES		
COSD	REAL	31 32 33 34
SIND	REAL	31 32 33 34
COMMON BLOCKS LENGTH MEMBERS - BIAS NAME(LENGTH)		
/ /	3030	0.0 (3030)
EQUIV-CLASSES - LENGTH MEMBERS - BIAS NAME(LENGTH)		
C	3030	1705 CFA12 (1) 1710 CFA13 (1) 1718 CFA22 (1) 1722 CFA23 (1) 1730 CFA32 (1) 1734 CFA33 (1) 1752 BPHO (1) 1753 BPSIO (1) 1755 A022 (1) 1754 A021 (1)


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SUBROUTINE 02
C** SUBROUTINE 02
C** ROTATIONAL DYNAMICS MODULE
COMMON C(3030)

5 C** DATA INPUTS
EQUIVALENCE (C(1760),FMIX)
EQUIVALENCE (C(1749),FMIY)
EQUIVALENCE (C(1750),FMIZ)
EQUIVALENCE (C(1751),CRAD)
EQUIVALENCE (C(1503),OPTN3)

10 C** INPUTS FROM OTHER MODULES
EQUIVALENCE (C(1303),FMABA)
EQUIVALENCE (C(1304),FMYBA)
EQUIVALENCE (C(1305),FMZBA)

15 C** STATE VARIABLE OUTPUTS
EQUIVALENCE (C(1700),CFA110)
EQUIVALENCE (C(1733),CFA11)
EQUIVALENCE (C(1704),CFA120)
EQUIVALENCE (C(1707),CFA12)
EQUIVALENCE (C(1708),CFA130)
EQUIVALENCE (C(1711),CFA13)
EQUIVALENCE (C(1712),CFA210)
EQUIVALENCE (C(1715),CFA21)
EQUIVALENCE (C(1716),CFA220)
EQUIVALENCE (C(1719),CFA22)
EQUIVALENCE (C(1720),CFA230)
EQUIVALENCE (C(1723),CFA23)
EQUIVALENCE (C(1724),CFA310)
EQUIVALENCE (C(1727),CFA31)
EQUIVALENCE (C(1720),CFA320)
EQUIVALENCE (C(1731),CFA32)
EQUIVALENCE (C(1732),CFA330)
EQUIVALENCE (C(1735),CFA33)
EQUIVALENCE (C(1735),APD)
EQUIVALENCE (C(1739),MP)
EQUIVALENCE (C(1740),HQD)
EQUIVALENCE (C(1745),MQ)
EQUIVALENCE (C(1744),HRD)
EQUIVALENCE (C(1747),MR)

20 C** INTEGRATE BODY ANGULAR RATES
IF (OPTN3.EQ.1) GO TO 55
WPD = CRAD*FMABA/FMIX
55 HRD = (CRAD*FMYBA*(FMI2-FMI1)*NP*MR/CRAD)/FMIY
65 MRD = (CRAD*FMZBA*(FMI3-FMI1)*NP*MR/CRAD)/FMIZ

30 C** INTEGRATE ATTITUDE DIRECTION COSINES
49 CFA110 = (CFA21*MR-CFA31*MQ)/CRAD
CFA120 = (CFA22*MR-CFA32*MQ)/CRAD
CFA130 = (CFA23*MR-CFA33*MQ)/CRAD
CFA210 = (CFA31*MR-CFA11*HR)/CRAD
CFA220 = (CFA32*MR-CFA12*HR)/CRAD
CFA230 = (CFA33*MR-CFA13*HR)/CRAD
CFA310 = (CFA11*MR-CFA21*HR)/CRAD
CFA320 = (CFA12*MR-CFA22*HR)/CRAD

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CFA330 = (CFA13*W2-CFA23*WPI)/C340
 RETURN
 END

60

02 59
 02 60
 02 61

SYMBOLIC REFERENCE MAP (R-3)

ENTRY POINTS DEF LINE REFERENCES

1-02

VARIABLES SN TYPE RELOCATION

O C	REAL	ARRAY	RELOCATION	REFS	14	15	3	6	7	8	9	10	13
3246	CFA11	REAL	//	REFS	14	15	3	6	7	8	9	10	13
3243	CFA11D	REAL	//	REFS	24	25	25	26	27	28	29	30	31
3252	CFA12	REAL	//	REFS	32	33	33	34	35	36	37	38	39
3247	CFA12D	REAL	//	REFS	40	41	41	53	56	57	58	59	60
3256	CFA13	REAL	//	REFS	19	18	18	DEFINED	50	51	52	53	54
3253	CFA13D	REAL	//	REFS	20	21	21	DEFINED	54	55	56	57	58
3262	CFA21	REAL	//	REFS	23	23	23	DEFINED	58	59	60	61	62
3257	CFA21D	REAL	//	REFS	22	22	22	DEFINED	52	53	54	55	56
3266	CFA22	REAL	//	REFS	25	25	25	DEFINED	50	51	52	53	54
3263	CFA22D	REAL	//	REFS	24	24	24	DEFINED	53	54	55	56	57
3272	CFA23	REAL	//	REFS	27	27	27	DEFINED	51	52	53	54	55
3267	CFA23D	REAL	//	REFS	26	26	26	DEFINED	54	55	56	57	58
3276	CFA31	REAL	//	REFS	29	29	29	DEFINED	58	59	60	61	62
3273	CFA31D	REAL	//	REFS	28	28	28	DEFINED	52	53	54	55	56
3302	CFA32	REAL	//	REFS	31	31	31	DEFINED	50	51	52	53	54
3277	CFA32D	REAL	//	REFS	30	30	30	DEFINED	53	54	55	56	57
3306	CFA33	REAL	//	REFS	33	33	33	DEFINED	56	57	58	59	60
3303	CFA33D	REAL	//	REFS	32	32	32	DEFINED	51	52	53	54	55
3326	CRAD	REAL	//	REFS	35	35	35	DEFINED	57	58	59	60	61
3323	FMIX	REAL	//	REFS	34	34	34	DEFINED	52	53	54	55	56
3324	FMIX	REAL	//	REFS	9	9	9	DEFINED	45	46	47	48	49
3325	FMIX	REAL	//	REFS	54	54	54	DEFINED	2*45	2*47	50	51	52
2426	FMX8A	REAL	//	REFS	6	6	6	DEFINED	55	56	57	58	59
2427	FMX8A	REAL	//	REFS	7	7	7	DEFINED	45	46	47	48	49
2430	FMZ8A	REAL	//	REFS	8	8	8	DEFINED	46	47	48	49	50
6656	OPTN3	REAL	//	REFS	13	13	13	DEFINED	45	46	47	48	49
3312	WP	REAL	//	REFS	14	14	14	DEFINED	45	46	47	48	49
3307	WPD	REAL	//	REFS	15	15	15	DEFINED	47	48	49	50	51
3316	WQ	REAL	//	REFS	10	10	10	DEFINED	44	45	46	47	48
3313	WQD	REAL	//	REFS	37	37	37	DEFINED	46	47	48	49	50
3322	WR	REAL	//	REFS	58	58	58	DEFINED	58	59	60	61	62
3317	WRD	REAL	//	REFS	36	36	36	DEFINED	45	46	47	48	49
3314	WQD	REAL	//	REFS	39	39	39	DEFINED	50	51	52	53	54
3322	WR	REAL	//	REFS	38	38	38	DEFINED	46	47	48	49	50
3317	WRD	REAL	//	REFS	41	41	41	DEFINED	50	51	52	53	54
3314	WQD	REAL	//	REFS	40	40	40	DEFINED	47	48	49	50	51

STATEMENT LABELS DEF LINE REFERENCES

0 49 INACTIVE 50

6 55 INACTIVE 46

0 65 INACTIVE 47

COMMON BLOCKS LENGTH MEMBERS BIAS NAME(LENGTH) 0 C (3830)

SUBROUTINE 02		7474	OPT=1	FTN 4.2+73037	05/35/75	16-17-62	PAGE 4
EQUIV CLASSES	LENGTH	MEMBERS	BIAS NAME (LEN:TH)				
C	3830						
		1302 FM28A	(1)	1303 FM28A	(1)	1304 FM28A	(1)
		1699 CFA113	(1)	1702 CFA11	(1)	1703 CFA120	(1)
		1706 CFA12	(1)	1707 CFA130	(1)	1710 CFA13	(1)
		1711 CFA213	(1)	1714 CFA21	(1)	1715 CFA220	(1)
		1718 CFA22	(1)	1719 CFA230	(1)	1722 CFA23	(1)
		1723 CFA310	(1)	1725 CFA31	(1)	1727 CFA320	(1)
		1730 CFA32	(1)	1731 CFA330	(1)	1734 CFA33	(1)
		1735 W2D	(1)	1738 WP	(1)	1739 WQD	(1)
		1742 MQ	(1)	1743 W2J	(1)	1746 WR	(1)
		1747 PMIX	(1)	1748 FMIY	(1)	1749 FMIZ	(1)
		1750 CRAD	(1)	3502 SPIN3	(1)		
STATISTICS							
PROGRAM LENGTH	543	52					
CM BLANK COMMON LENGTH	73663	3830					

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SUBROUTINE SLI
C**SEEKER-INIT-MODULE
COMMON C(3630)

5  DIMENSION IZ(50), IY(50), ISNDX(40)
   EQUIVALENCE (C(464), ISNDX, (C(3512), I3512))
   EQUIVALENCE (C(470), BTGER)
   EQUIVALENCE (C(471), BPGER)
   EQUIVALENCE (C(465), SOY)
   EQUIVALENCE (C(466), SZ)
10  1. FORMAT(5X,2H2,6X,4(I13,I11)/(13X,4(I13,I11)))
   2. FORMAT(5X,2H2,6X,4(I13,I11)/(13X,4(I13,I11)))
   EQUIVALENCE (C(11),BT)
   EQUIVALENCE (C(12),BZ)
   EQUIVALENCE (C(201),XSTEP)
   EQUIVALENCE (C(500),IZ)
   EQUIVALENCE (C(501),IY)
   DIMENSION IPL(100)
   EQUIVALENCE (C(422),SWP)
   EQUIVALENCE (C(0411),MLQ)
   EQUIVALENCE (C(0451),4LR)
   EQUIVALENCE (C(0419),MLQS)
   EQUIVALENCE (C(0423),MLRS)
   EQUIVALENCE (C(0427),8THG)
   EQUIVALENCE (C(0431),BPSIG)
   EQUIVALENCE (C(2561),N)
   EQUIVALENCE (C(2562),IPL)
   EQUIVALENCE (C(14504),OPIN)
   EQUIVALENCE (C(523), DERIV)
   IPL(N)=42
   IPL(N+1)=423
   IPL(N+2)=403
   IPL(N+3)=412
   IPL(N+4)=419
   IPL(N+5)=423
   N=N+6
   C(411)=0.
   C(415)=0.
   C(419)=0.
   C(423)=0.
   BY=0.
   BZ=0.
   SOY = 0.
   SZ = 0.
   DO 10 I=1, I3512
   IDO = I

C
C MONTE CARLO SEEKER OUTPUT STARTING VALUES
C
   IF(IISNDX(I),EQ,11) CALL MCARLO (DUM, 1, IDO)
   IF(IISNDX(I),EQ,12) CALL MCARLO (DUM, 1, IDO)
   IF(IISNDX(I),EQ,50) CALL MCARLO (DUM, 1, IDO)
   IF(I485(IY),JT,0. , BT = SIG(1.8Y)
   IF(I485(IY),GT,0. , BZ = SIG(1.8Z)

C
C MONTE CARLO SEEKER POINTING ERROR
C
   IF(IISNDX(I),EQ,470) CALL MCARLO (DUM, 1, IDO)

```



```

        IF(IISNOK(1),E2.471) CALL MCARLO (DUM, 1, 100)
        60 C ** MONTECARLO SEEKER DRIFT
            IF(IISNOK(1),E2.453) CALL MCARLO (DUM, 1, 100)
            IF(IISNOK(1),E2.466) CALL MCARLO (DUM, 1, 100)
        C
        10 CONTINUE
        65 8THG = 8THG + 312ERR
            8PSIG = 8PSIG + 8PSERR
        C
            MLQS=SMP*(8THG-3PSIG)
            MLQ=SMP*(8THG-8PSIG)
            MLR=SMP*(8THG+8PSIG)
            MLRS=SMP*(8THG+8PSIG)
            C(13) = -1.
            DERSV=.002
            C(461)=0.
            C(462)=0.
            C(463)=0.
            C(464)=0.
            IF(PTN(31.1) 50 TO 30
        70 C(461)=1.
            C(462)=1.
            C(463)=1.
            C(464)=1.
            30 CONTINUE
            NI=1
            MI=1
            SET=0.
            DO 200 I=1,50
                IZ(I)=0
                200 IY(I)=0
                RETURN
            ENTRY 00
            IF(SET.GT.0.) RETURN
            IF(SET.GT.50) RETURN
            IF(MI.LE.10) 50 TO 100
            MI=MI+1
            NI=1
        100 IZ(NI)=IZ(NI)+INT(32+2.)+10*(10-MI)
            IY(NI)=IY(NI)+INT(197+2.)+10*(10-MI)
            MI=MI+1
            RETURN
            ENTRY 50
            IF(SET.GT.0.01*KSTEP.NE.2) RETURN
            SET=1.
            WRITE(6,1) (IZ(I),I=1,NI)
            WRITE(6,2) (IY(I),I=1,NI)
            RETURN
            END
    
```


EXTERNALS		TYPE	ARGS	REFERENCES		50	51	57	58	61	62
MCARLO			3		42						
INLINE FUNCTIONS		TYPE	ARGS	DEF LINE REFERENCES							
ABS		REAL	1	INTRIN		52	53				
INT		INTEGER	1	INTRIN		97	98				
SIGN		REAL	2	INTRIN		52	53				
STATEMENT LABELS		DEF LINE		REFERENCES							
213 1		FMT	10	104							
220 2		FMT	11	105							
0 10			64	64							
116 30			83	78							
140 100			97	94							
0 200			89	87							
LOGPS LABEL		INDEX	FROM TO	LENGTH	PROPERTIES						
22 10		I	44 64	523	EXT REFS						
123 200		I	87 89	28	INSTACK						
COMMON BLOCKS		LENGTH	MEMBERS	BIAS NAME(LENGTH)							
/ /		3830		J C (3830)							
EQUIV CLASSES		LENGTH	MEMBERS	BIAS NAME(LENGTH)							
C		3836		10 BY (1)	11 82	(1)	410 MLQ	(1)	422 MLRS	(1)	
			416 MLR	(1)	418 MLRS	(1)	430 OPSIG	(1)	451 SMP	(1)	
			425 BTMG	(1)	463 SDZ	(1)	669 BTERR	(1)	622 DERSV	(1)	
			464 SDY	(1)	599 IZ	(50)	2550 N	(1)	3511 13512	(1)	
			473 BTERR	(1)	2013 KSTCP	(1)					
			549 IV	(50)	3503 OPTMA	(1)					
			2561 IPL	(100)							
			3633 ISNOX	(40)							
STATISTICS											
PROGRAM LENGTH		2593 169									
CM BLANK COMMON LENGTH		73663 3830									


```

C
C**OTHER-OUTPUTS
60  EQUIVALENCE (C(11),BY)
    EQUIVALENCE (C(12),BZ)
    EQUIVALENCE (C(13),WLAHQ)
    EQUIVALENCE (C(14),WLAHR)
    EQUIVALENCE (C(15),BEPZY)
    EQUIVALENCE (C(16),BEPZY)
    EQUIVALENCE (C(17),WZ)
    EQUIVALENCE (C(18),WZ)
    EQUIVALENCE (C(19),BGOEFL)
    EQUIVALENCE (C(20),SOZ)
70  EQUIVALENCE (C(21),SOZ)

C
C**DIRECTION COSINES FOR BODY TO PLATFORM TRANSFORMATION
    BTACT = BTHTG
    SPACT = BPSIG
    UCT=COS(BTACT)
    UST=SIN(BTACT)
    UCP=CCSD(BPACT)
    USP=SIND(BPACT)
    UB11 = UCT*UCP
    UB12 = UCT*USP
    UB13 = -UST
    UB21 = -USP
    UB22 = UCP
    UB23 = 0.
    UB31 = -UST*UCP
    UB32 = -UST*USP
    UB33 = UCT

C
C**CALCULATE TOTAL DEFLECTION OF SIGNALS
90  BGOEFL=SQRT(BTACT**2+BPSIG**2)

C
C**TRANSFORM LOS FROM BODY TO SIGNAL AXES
    RXG = UB11*RXA+UB12*RYA+UB13*RZA
    RYG = UB21*RXA+UB22*RYA+UB23*RZA
    RZG = UB31*RXA+UB32*RYA+UB33*RZA

C
C**LOS-ERRORS IN PLATFORM COORDINATES
    BEPSZ = ATAND(-RZG,RYG)
    BEPSY = ATAND(RYG,RYG)
    IF (OPTNSK.LE.0.) GO TO 60

C
C**SEEKER OUTPUT SIGNALS
100  IF (OPTNSK.LE.0.) GO TO 60

C
C**VIDICON TRACKER
105  IF (RAGE.LT. R3K) RETURN
    WLAHQ = JEO*BEPSZ
    WLAHR = GEO*BEPSY
    GO TO 30

C
C**QUADRENT TRACKER
110  8C CONTINUE
    IF (C(1975).LE.0.) GO TO 82
    IF (1.LT.(ST-.000001)) GO TO 82
    IF (C(13).LE.0.) GO TO 820

```

```

115      C(13) = -1.
      ST = 1
      C(2664) = DT / AINT(DT / C(2764))
      820 CONTINUE
      ST = ST + DT
      IF (RANGE - GT - RLOCK) GO TO 81
      CZ = 2 * BEPSZ / CFOWZ
      CY = 2 * BEPSY / CFOWY
      IF (CZ * 2 - GT, 1 - CY * 2) GO TO 81
      82 = SIGN(1 - BEPSZ)
      BY = SIGN(1 - BEPSY)
      IKOB = 83872 * (RANGE / 32810 - 1) * 2
      IF (ABS(BEPSZ) - LT - IKOB) 82 = 0
      IF (ABS(BEPSY) - LT - IKOB) BY = 0
      CALL EO
      130 IF (CAGE - 51 - 0.1) 50 TO 62
      UZ = EZ
      UY = 9Y
      CAGE = 1
      WRITE(6,131) T, BEPSZ, BEPSY
      135 GO TO 82
      81 82 = 0
      BY = 0
      C**SEEKER COMPENSATION
      82 WLAHQ = 32 * GS
      WLAHQ = 87 * GS
      WQP = WLAHQ
      WRP = WLAHQ
      IF (MSL - LE, 0.1) 50 TO 83
      WLRQ = WLAHQ
      WLRD = WLAHQ
      WLRQ = WLRQ + SEPS
      WLRD = WLRD + SEPS
      WQP = WLRQ / ASL + WLR
      WRP = WLRD / ASL + WLR
      WLAHQ = WQP
      WLAHQ = WRP
      IF (MSN - LE, 0.1) 50 TO 81
      WLRQD = MSV * (WQP - WLRQ)
      WLRSD = MSV * (WRP - WLRD)
      WQP = WLRQD / WLR + WLR
      WRP = WLRSD / WLR + WLR
      C**SEEKER SWITCHING LOGIC
      83 IF (CAGE - 51 - 0.1) 50 TO 30
      C PITCH PLANE
      16 IF (TKRZ - 51 - 0.1) GO TO 20
      IF (82 * UZ - 5E, 0.1) GO TO 12
      TKRZ = 1
      WRITE(6,102) T, BEPSZ, BEPSY
      GO TO 20
      12 WLAHQ = 92 * GSX
      WQP = WLAHQ
      WLRQD = 0
      WLRSD = 0
      UZ = 8Z
      C YAW PLANE
      20 IF (TKRY - 51 - 0.1) 50 TO 30

```

	IF (BYUY .GE. P.) G3 TO 22	S1	278
	TRAY = L	S1	279
	WRITE(5,103) I, BEPSZ, BEPSI	S1	280
175	GO TO 30	S1	281
	22 MLAMR = 37*GSX	S1	282
	MKP = MLAMR	S1	283
	MLRD = 0.	S1	284
	MLRSO = 0.	S1	285
180	UY = BY	S1	286
	36 CONTINUE	S1	287
	C	S1	288
	C**MISSILE BODY RATES IN GIMBAL AXES-	S1	289
	WZ = UB31*WP+JB32*WQ+UB33*WR	S1	290
185	WT = UB21*WP+JB22*WQ+UB23*WR	S1	291
	C	S1	292
	G**GIMBAL COUPLING	S1	293
	UZK = SXP*(-BIM12 + .1*BPSI1)	S1	294
	UTK = SXP*(-BPS12 - .1*BIM12)	S1	295
190	UZK = UZK + SOZ	S1	295
	UYK = UYK + SOY	S1	297
	C	S1	298
	G**GIMBAL ANGLE DERIVATIVES	S1	299
	BTHGD = WOP + UZK - MY	S1	303
195	BPSLGD = MKP + UTK - WZ/JB33	S1	301
	C	S1	302
	IF (.CAGE .GT. 0.) RETURN	S1	303
	MLANQ = 0.	S1	304
	MLAMR = 0.	S1	305
200	MLSD = 0.	S1	306
	MLRO = 0.	S1	307
	MLRSO = 0.	S1	308
	MLASD = 0.	S1	309
	BTHIGO = 0.	S1	313
205	BPSLGO = 0.	S1	311
	RETURN	S1	312
	END	S1	313
	C**HELFFIRE AUTOPILOT INITIATION MODULE	S1	314
	C**HIGH FREQ. MODEL	S1	315

SYMBOLIC REFERENCE MAP (R=0)

ENTRY POINTS	DEF LINE	REFERENCES	1	51	105	137	206
VARIABLES	SN	TYPE	RELOCATION				
676 808	REAL	//	REFS	16	126		
663 8EPSY	REAL	//	REFS	65	107		
			174	DEFINED			
562 8EPSZ	REAL	//	REFS	64	106		
			174	DEFINED			
666 8GDEFI	REAL	//	REFS	58	DEFINED		
364 8PACT	REAL	//	REFS	77	78	DEFINED	
656 8PSIG	REAL	//	REFS	57	74		
653 8PSIGD	REAL	//	REFS	56	DEFINED		
363 8TACT	REAL	//	REFS	75	76	DEFINED	
652 8THIG	REAL	//	REFS	55	73		
647 8THIGD	REAL	//	REFS	4	DEFINED		
12 8Y	REAL	//	REFS	50	132		
			125	128	137		
13 8Z	REAL	//	REFS	51	131		
			124	127	136		
0 C	REAL	ARRAY	REFS	4	14		
			13	20	21		
			27	28	30		
			38	39	40		
			48	49	50		
			55	57	60		
			66	57	58		
			DEFINED	115	117		
714 GAGE	REAL	//	REFS	31	130	150	133
700 GFOVY	REAL	//	REFS	18	122		
677 GFOVZ	REAL	//	REFS	17	121		
406 CY	REAL	//	REFS	123	DEFINED	122	
405 GZ	REAL	//	REFS	133	DEFINED	121	
675 UT	REAL	//	REFS	15	2*117	119	
705 G50	REAL	//	REFS	23	106	107	
707 GS	REAL	//	REFS	25	139	140	
701 GSK	REAL	//	REFS	19	165	176	
706 OPTNSK	REAL	//	REFS	24	102		
562 RANGE	REAL	//	REFS	37	105		
704 ROK	REAL	//	REFS	22	105	120	126
674 RLOCK	REAL	//	REFS	14	120		
563 RXBA	REAL	//	REFS	38	93		
402 RXG	REAL	//	REFS	38	99	94	95
564 RYBA	REAL	//	REFS	39	93	DEFINED	93
403 RIG	REAL	//	REFS	39	94	94	95
565 RZBA	REAL	//	REFS	40	93	34	95
404 RZG	REAL	//	REFS	38	DEFINED	95	
720 SDY	REAL	//	REFS	69	191		
721 SDZ	REAL	//	REFS	70	190		
713 ST	REAL	//	REFS	20	146	147	
703 SWP	REAL	//	REFS	30	113	119	119
3717 T	REAL	//	REFS	21	184	189	
407 TKOB	REAL	//	REFS	5	113	116	134
716 TKRY	REAL	//	REFS	127	128	DEFINED	163
			33	171	DEFINED	173	174

VARIABLES	SM	TYPE	RELOCATION	REFS	32	160	DEFINED	162
715 TKRZ	REAL	/ /	REFS	32	160	DEFINED	162	
717 TRKZY	REAL	/ /	REFS	34	DEFINED	79		
371 UB11	REAL	/ /	REFS	33	DEFINED	80		
372 UB12	REAL	/ /	REFS	33	DEFINED	81		
373 UB13	REAL	/ /	REFS	34	DEFINED	82		
374 UB21	REAL	/ /	REFS	34	DEFINED	83		
375 UB22	REAL	/ /	REFS	34	DEFINED	84		
376 UB23	REAL	/ /	REFS	34	DEFINED	85		
377 UB31	REAL	/ /	REFS	35	DEFINED	86		
400 UB32	REAL	/ /	REFS	35	DEFINED	87		
401 UB33	REAL	/ /	REFS	35	DEFINED	88		
367 UCP	REAL	/ /	REFS	79	83	85	DEFINED	87
365 UCT	REAL	/ /	REFS	79	80	87	DEFINED	77
370 USP	REAL	/ /	REFS	30	82	86	DEFINED	75
366 UST	REAL	/ /	REFS	31	85	86	DEFINED	76
411 UY	REAL	/ /	REFS	172	DEFINED	132	180	
415 UYK	REAL	/ /	REFS	131	195	DEFINED	189	191
410 UZ	REAL	/ /	REFS	151	DEFINED	131	169	
414 UZK	REAL	/ /	REFS	130	194	DEFINED	186	130
622 WLAMQ	REAL	/ /	REFS	32	141	144	166	DEFINED 106 139
			REFS	150	198			
626 WLAMR	REAL	/ /	REFS	33	142	145	177	DEFINED 137 148
			REFS	151	139			
632 WLQ	REAL	/ /	REFS	47	148			
627 WLQD	REAL	/ /	REFS	46	146	148	DEFINED	144 146 167
642 WLQS	REAL	/ /	REFS	51	153	155		
637 WLQSD	REAL	/ /	REFS	50	155	DEFINED	153	150 202
636 WLR	REAL	/ /	REFS	49	149			
633 WLRO	REAL	/ /	REFS	48	147	149	DEFINED	145 147 178
			REFS	201				
646 WLRS	REAL	/ /	REFS	53	154	156		
643 WLRSO	REAL	/ /	REFS	52	156	DEFINED	154	179 203
712 WL2	REAL	/ /	REFS	28	155	156		
3312 WP	REAL	/ /	REFS	41	184	185		
3316 WQ	REAL	/ /	REFS	42	184			
412 WQP	REAL	/ /	REFS	150	153	194	DEFINED	141 148 155
			REFS	166				
3322 WR	REAL	/ /	REFS	43	184	185		
413 WRP	REAL	/ /	REFS	151	154	195	DEFINED	142 149 156
			REFS	177				
710 WSL	REAL	/ /	REFS	26	143	148	149	
711 WSN	REAL	/ /	REFS	27	152	153	154	
665 WY	REAL	/ /	REFS	57	194	DEFINED	185	
664 WZ	REAL	/ /	REFS	56	195	DEFINED	184	

FILE NAMES MODE
TAPE6 FMT WRITES 134 153 174

EXTERNALS	TYPE	ARGS	REFERENCES
ATAND	REAL	2	99
COSO	REAL	1	77
QU		0	123
SINU	REAL	1	75
SORT	REAL	1 LIBRARY	93

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INLINE FUNCTIONS	TYPE	ARGS	DEF LINE	REFERENCES
ABS	REAL	1 INTRIN	127	128
ASIN	REAL	1 INTRIN	117	
SIGN	REAL	2 INTRIN	124	125

STATEMENT LABELS	DEF LINE	REFERENCES
0 10 INACTIVE	160	
202 12	165	151
207 20	171	153
217 22	175	172
224 30	181	175
61 80	111	108
135 81	135	121
137 82	139	112
171 83	158	171
274 101 FMT	143	130
306 102 FMT	152	
320 103 FMT	163	
74 820	118	119

COMMON BLOCKS / / 3830 MEMBERS - BIAS NAME(LEN,TH) 3 C (3830)

EQUIV CLASSES	LENGTH	MEMBERS	BIAS NAME(LEN,TH)
10 97	(1)	371 RYBA	370 RANGE (1)
402 M-44Q	(1)	372 RYBA	373 RZBA (1)
410 WLC	(1)	405 MLAMR	407 WLOQ (1)
415 MLQSD	(1)	411 MLRD	414 MLCR (1)
422 MLRS	(1)	418 MLRS	419 MLRSJ (1)
427 WPSIGD	(1)	423 BT-1GD	426 BTMTG (1)
435 BEPSY	(1)	430 BPSIS	434 BEPSZ (1)
438 RGDEF	(1)	436 WZ	437 WY (1)
446 B03	(1)	444 RLOCK	445 DT (1)
449 55X	(1)	447 CFJYZ	448 CFQVY (1)
452 MBK	(1)	450 SEPS	451 SHP (1)
455 05	(1)	453 GED	454 OPTNSK (1)
458 W-2	(1)	455 WS-	457 WSN (1)
461 J-37	(1)	459 ST	460 CAGE (1)
464 SOY	(1)	462 TKRY	463 TRKZY (1)
1742 W2	(1)	465 SDZ	1738 WP (1)
		1746 WR	1999 T (1)

STATISTICS:
PROGRAM LENGTH 4163 270
CH-BLANK COMMON LENGTH 73668 3830

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SUBROUTINE CII
COMMON C(3030)
DIMENSION IPL(10)
EQUIVALENCE (C(2561),N)
EQUIVALENCE (C(2562),IPL)
C
IPL(N) = 000
IPL(N+1) = 004
IPL(N+2) = 009
IPL(N+3) = 312
IPL(N+4) = 015
IPL(N+5) = 020
IPL(N+6) = 024
IPL(N+7) = 028
IPL(N+8) = 032
IPL(N+9) = 036
IPL(N+10) = 040
IPL(N+11) = 044
IPL(N+12) = 048
IPL(N+13) = 052
N = N+14
C(803) = 0
C(807) = 3
C(811) = 0
C(815) = 0
C(819) = 0
C(823) = 0
C(827) = 0
C(831) = 0
C(835) = 0
C(839) = 0
C(843) = 0
C(847) = 0
C(851) = 0
C(855) = 0
C(811) = C(870) + 2 - (851)
C(823) = C(879)
C(831) = C(1233)
C(847) = C(831)
C(839) = C(831)
IF (C(877) .LE. 0.) RETURN
IPL(N) = 301
IPL(N+1) = 305
IPL(N+2) = 303
C(904) = 0
C(908) = 0
C(912) = 0
RETURN
END
C**HELFFIRE - AUTOPILOT MODULE
C**HIGH FREQ MODEL (USE DER = .0025)

```

SYMBOLIC REFERENCE MAP (123)

ENTRY POINTS DEF LINE REFERENCES
1 CII 1 41 43

VARIABLES	SN	TYPE	REAL	ARRAY	RELOCATION	REFS
0 C						
	2					41
	41	DEFINED				22
	28					23
	36					30
						31
						32
						33
						34
						35
						36
						37
						38
						39
						40
						45
						46
5001 IPL	3	INTEGER		ARRAY		REFS
	11					11
	12					13
	13					14
	14					15
	15					16
	16					17
	17					18
	18					19
	19					20
	20					21
	21					22
	22					23
	23					24
	24					25
	25					26
	26					27
	27					28
	28					29
	29					30
	30					31
	31					32
	32					33
	33					34
	34					35
	35					36
	36					37
	37					38
	38					39
	39					40
	40					41
	41					42
	42					43
	43					44
	44					45
	45					46
	46					47
	47					48
	48					49
	49					50
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	51					52
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	53					54
	54					55
	55					56
	56					57
	57					58
	58					59
	59					60
	60					61
	61					62
	62					63
	63					64
	64					65
	65					66
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	67					68
	68					69
	69					70
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	90					91
	91					92
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	93					94
	94					95
	95					96
	96					97
	97					98
	98					99
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Line	Text	Line	Text
60	EQUIVALENCE (C1 5131, WLRSS)	110	C1
	EQUIVALENCE (C1 8201, WLRSSD)	111	C1
	EQUIVALENCE (C1 8231, WLRSS)	112	C1
	EQUIVALENCE (C1 3241, BLRSSD)	113	C1
	EQUIVALENCE (C1 8271, BLQSS)	114	C1
	EQUIVALENCE (C1 8291, BLRSSD)	115	C1
	EQUIVALENCE (C1 3311, BLRSS)	116	C1
65	EQUIVALENCE (C1 3321, BLRSSD)	117	C1
	EQUIVALENCE (C1 3351, BLRSS)	118	C1
	EQUIVALENCE (C1 3361, BLRSSD)	119	C1
	EQUIVALENCE (C1 3391, BLRSS)	120	C1
	EQUIVALENCE (C1 8411, BLRSSD)	121	C1
70	EQUIVALENCE (C1 8431, BLRSS)	122	C1
	EQUIVALENCE (C1 8441, BLRSSD)	123	C1
	EQUIVALENCE (C1 8471, BLRSS)	124	C1
	EQUIVALENCE (C1 8491, BLRSSD)	125	C1
	EQUIVALENCE (C1 3511, BLRSSD)	126	C1
75	EQUIVALENCE (C1 8521, BLRSSD)	127	C1
	EQUIVALENCE (C1 8531, BLRSS)	128	C1
	EQUIVALENCE (C1 3591, BLRSSD)	129	C1
	EQUIVALENCE (C1 8611, BLRSSD)	130	C1
	EQUIVALENCE (C1 8641, BLRSSD)	131	C1
	EQUIVALENCE (C1 8671, BLRSSD)	132	C1
80	EQUIVALENCE (C1 8691, BLRSSD)	133	C1
	EQUIVALENCE (C1 3031, BLRSSD)	134	C1
	EQUIVALENCE (C1 3041, BLRSSD)	135	C1
	EQUIVALENCE (C1 3051, BLRSSD)	136	C1
	EQUIVALENCE (C1 3061, BLRSSD)	137	C1
85	EQUIVALENCE (C1 3071, BLRSSD)	138	C1
	EQUIVALENCE (C1 3081, BLRSSD)	139	C1
	EQUIVALENCE (C1 3091, BLRSSD)	140	C1
	EQUIVALENCE (C1 3101, BLRSSD)	141	C1
90	EQUIVALENCE (C1 3111, BLRSSD)	142	C1
	EQUIVALENCE (C1 3121, BLRSSD)	143	C1
	EQUIVALENCE (C1 3131, BLRSSD)	144	C1
	EQUIVALENCE (C1 3141, BLRSSD)	145	C1
	EQUIVALENCE (C1 3151, BLRSSD)	146	C1
95	EQUIVALENCE (C1 3161, BLRSSD)	147	C1
	EQUIVALENCE (C1 3171, BLRSSD)	148	C1
	EQUIVALENCE (C1 3181, BLRSSD)	149	C1
	EQUIVALENCE (C1 3191, BLRSSD)	150	C1
	EQUIVALENCE (C1 3201, BLRSSD)	151	C1
100	EQUIVALENCE (C1 3211, BLRSSD)	152	C1
	EQUIVALENCE (C1 3221, BLRSSD)	153	C1
	EQUIVALENCE (C1 3231, BLRSSD)	154	C1
	EQUIVALENCE (C1 3241, BLRSSD)	155	C1
105	EQUIVALENCE (C1 3251, BLRSSD)	156	C1
	EQUIVALENCE (C1 3261, BLRSSD)	157	C1
	EQUIVALENCE (C1 3271, BLRSSD)	158	C1
	EQUIVALENCE (C1 3281, BLRSSD)	159	C1
	EQUIVALENCE (C1 3291, BLRSSD)	160	C1
110	EQUIVALENCE (C1 3301, BLRSSD)	161	C1
	EQUIVALENCE (C1 3311, BLRSSD)	162	C1
	EQUIVALENCE (C1 3321, BLRSSD)	163	C1
	EQUIVALENCE (C1 3331, BLRSSD)	164	C1
	EQUIVALENCE (C1 3341, BLRSSD)	165	C1
	EQUIVALENCE (C1 3351, BLRSSD)	166	C1
	EQUIVALENCE (C1 3361, BLRSSD)	167	C1
	EQUIVALENCE (C1 3371, BLRSSD)	168	C1
	EQUIVALENCE (C1 3381, BLRSSD)	169	C1
	EQUIVALENCE (C1 3391, BLRSSD)	170	C1
	EQUIVALENCE (C1 3401, BLRSSD)	171	C1
	EQUIVALENCE (C1 3411, BLRSSD)	172	C1
	EQUIVALENCE (C1 3421, BLRSSD)	173	C1
	EQUIVALENCE (C1 3431, BLRSSD)	174	C1
	EQUIVALENCE (C1 3441, BLRSSD)	175	C1
	EQUIVALENCE (C1 3451, BLRSSD)	176	C1
	EQUIVALENCE (C1 3461, BLRSSD)	177	C1
	EQUIVALENCE (C1 3471, BLRSSD)	178	C1
	EQUIVALENCE (C1 3481, BLRSSD)	179	C1
	EQUIVALENCE (C1 3491, BLRSSD)	180	C1
	EQUIVALENCE (C1 3501, BLRSSD)	181	C1
	EQUIVALENCE (C1 3511, BLRSSD)	182	C1
	EQUIVALENCE (C1 3521, BLRSSD)	183	C1
	EQUIVALENCE (C1 3531, BLRSSD)	184	C1
	EQUIVALENCE (C1 3541, BLRSSD)	185	C1
	EQUIVALENCE (C1 3551, BLRSSD)	186	C1
	EQUIVALENCE (C1 3561, BLRSSD)	187	C1
	EQUIVALENCE (C1 3571, BLRSSD)	188	C1
	EQUIVALENCE (C1 3581, BLRSSD)	189	C1
</			

1115	WLQSSD = ANI*(MDC - ALQSSI)	CL	167
	WLRSSD = MNI*(MDC - ALRSS)	CL	168
	WLQSSD = WLSSS	CL	169
	WLRSSD = WLSSS	CL	170

CELEBRATE CYRO DYNAMICS AND TIMING

BTMS = -BTM2

1548-2-8P51

3XX = -3PH1

IF RES .LE. 0.1-50-10 10

SMTH = MMS (STHT - STHP)

(BMB3 - INE3) ASNM = AGN3
(dSES - iSES) ASNK = SOMS

SAFETY - 3000

$$\text{UPSIS} = -\text{RES} * \text{AINI}(\text{BP} \leq 1 / \text{RES}) + \text{SNPS}$$
$$B_{XX} \dots = -RES^*AIMT(BPH1/RES) + SNPM$$

CONTINUE

---IF 10FTW

8THYS = UT4F

APIS = UP51
AKB = 1181

BXX E OPHI
 B1M2--E--B1M2--

75d6 - 3P51
BINZ - 6-0102

144B-3-3P41-

CONTINUE

—

SUMMARY OF

REF - (S155-85270) - (S155-85270) - (S155-85270)

8KK --(BL255-3P51S) - (BL255-81M1S)

DANCE SIGNAL SHAPING AND ILLUSTRATION

COAST GUARDANCE SIGNAL SHAPING AND LISTENING
 0500P - 0500P -

0.1WSD = 0.1J5P

0XK50.Z-8KK5P

04XNM = 075XVB

8JJ500 = WJ*(WJ*(8JJ - 8JJ5) - 2.0)*JJK*8JJ50;

000000 = WJK*(WJK*(B(K - B(KS) - 2.00JK*B(KKS))

$$SS_{XX} = \sum x^2 - \frac{(\sum x)^2}{n} = 100 - \frac{(10)^2}{10} = 90$$

$\frac{1}{\sqrt{2}} \begin{pmatrix} 1 & -i \\ 0 & 1 \end{pmatrix}$

$\text{offset}(\text{KfMin}) = \text{offset}(\text{Kf} - 1) - 1$ (offsets) if

```
IF (ABS(BKKSS) .GT. 1JK) BKSS = SIGN(HJK, BKKSS)
```

```
IF (ABS(BXXSS) .GT. 1XX) BX(SS = SIGN(XX, BXXSS
```

Abstract

HANDS TO ACTUATORS

SSRFB = 111317308

BDLTC(12) = BKSS + EXXE
BDLTC(13) = B11E + SXAE

SSXX - 3XKX = 191711308
SSXX - 3XKX = 191711308

DELIC (4) - FK33 - 3A33
RETURN - - - - -

0413

100

SYMBOLIC REFERENCE MAP (R-3)

ENTRY POINTS	DEF LINE	REFERENCES	1-C1
1527 8DELTC	REAL	REFS	3
1560 8JJ	REAL	REFS	90
1566 8JJS	REAL	REFS	58
1503 8JJSO	REAL	REFS	67
1477 8JJSOD	REAL	REFS	85
1502 8JJSOP	REAL	REFS	66
1563 8JJS	REAL	REFS	93
1561 8KK	REAL	REFS	91
1516 8KKS	REAL	REFS	72
1513 8KKSOD	REAL	REFS	71
1507 8KKSOD	REAL	REFS	69
1512 8KKSOP	REAL	REFS	70
1564 8KKS	REAL	REFS	94
1472 8LQSS	REAL	REFS	62
1467 8LQSSD	REAL	REFS	51
1476 8LQSS	REAL	REFS	64
1473 8LQSSD	REAL	REFS	53
540 BPH1	REAL	REFS	32
1566 BPS1S	REAL	REFS	96
542 BPS1	REAL	REFS	34
1565 BTHS	REAL	REFS	95
541 BTH2	REAL	REFS	33
1557 BXX	REAL	REFS	99
1526 BXXS	REAL	REFS	76
1523 BXXSD	REAL	REFS	75
1517 BXXSOD	REAL	REFS	73
1522 BXXSP	REAL	REFS	74
1562 BXXSS	REAL	REFS	92
Q C	REAL	REFS	2
714 CAGE	REAL	REFS	35
1551 DJK	REAL	REFS	37
1547 DXX	REAL	REFS	18
1534 GB1AS	REAL	REFS	7
1553 GJK	REAL	REFS	22
1535 GN	REAL	REFS	8
1552 GXX	REAL	REFS	21
1545 HJK	REAL	REFS	16
1571 HXX	REAL	REFS	26
3616 QPTM	REAL	REFS	40
1555 QB1AS	REAL	REFS	24

VARIABLES	SN	TYPE	RELOCATION	REFS	25	185	112	2*129	2*130
1556 RBAS	REAL	REAL	REFS	23	124	2*129	127		
1554 RES	REAL	REAL	REFS	32	130	DEFINED			
1614 SMPH	REAL	REAL	REFS	00	129	DEFINED	126		
1616 SMPS	REAL	REAL	REFS	78	128	DEFINED	125		
1684 SMTH	REAL	REAL	REFS	29	127				
114 SPHI	REAL	REAL	REFS	33	127				
1617 SPHP	REAL	REAL	REFS	31	126				
148 SPST	REAL	REAL	REFS	01	125				
1613 SPSP	REAL	REAL	REFS	79	125				
1687 STHP	REAL	REAL	REFS	30	125				
126 STHT	REAL	REAL	REFS	46	106	139			
3717 T	REAL	REAL	REFS	6	106	109			
1533 TOY	REAL	REAL	REFS	39	110				
716 TKRY	REAL	REAL	REFS	30	106				
715 TKRZ	REAL	REAL	REFS	41	135				
3017 UPHI	REAL	REAL	REFS	42	134				
3020 UPSI	REAL	REAL	REFS	43	133				
3021 UTHI	REAL	REAL	REFS	3					
211 VAR	REAL	REAL	REFS	19	2*150	2*151			
1550 WJK	REAL	REAL	REFS	11	104	105			
1540 WL	REAL	REAL	REFS	35	102	109			
622 WLAHQ	REAL	REAL	REFS	36	103	113			
626 WLAHQ	REAL	REAL	REFS	14	2*153	2*154			
1543 WLJK1	REAL	REAL	REFS	15	2*153	2*154			
1544 WLJK2	REAL	REAL	REFS	52	102	104			
1446 WLSQ	REAL	REAL	REFS	51	102	104	DEFINED 100		
1437 WLOSQ	REAL	REAL	REFS	49	DEFINED 102	107			
1442 WLQSP	REAL	REAL	REFS	50	100				
1452 WLOSS	REAL	REAL	REFS	54	115	117			
1447 WLOSSD	REAL	REAL	REFS	33	DEFINED 115	115			
1462 WLR5	REAL	REAL	REFS	50	103	105	DEFINED 101		
1457 WLRSD	REAL	REAL	REFS	57	103	105	DEFINED 101		
1453 WLRSD	REAL	REAL	REFS	55	DEFINED 103	111			
1456 WLRSP	REAL	REAL	REFS	56	101				
1466 WLRSS	REAL	REAL	REFS	60	116	110			
1463 WLRSSD	REAL	REAL	REFS	39	DEFINED 116				
1541 WLX1	REAL	REAL	REFS	12	2*152				
1542 WLX2	REAL	REAL	REFS	13	2*152				
1603 WNS	REAL	REAL	REFS	77	125	127			
1537 WN1	REAL	REAL	REFS	10	115	116			
1536 WN2	REAL	REAL	REFS	9	2*102	2*103			
207 WQC	REAL	REAL	REFS	115	DEFINED 104	100	109		
210 WRC	REAL	REAL	REFS	116	DEFINED 105	112	113		
1546 WXX	REAL	REAL	REFS	17	2*149				

STATEMENT LABELS	DEF LINE	REFERENCES
33 4	110	105
42 5	114	110
77 10	131	124
110 15	139	132

COMMON BLOCKS LENGTH 3830 MEMBERS - BIAS NAME(LENGTH) B C (3830)

EQUIV CLASSES LENGTH 3830 MEMBERS - BIAS NAME(LENGTH)

75 SPFI	(1)	96 SPFI	(1)
352 BP41	(1)	354 BP51	(1)
402 W-AMQ	(1)	460 CAGE	(1)
461 TKZ0	(1)	799 WLSDD	(1)
802 MLJSP	(1)	806 WLQS	(1)
807 MLJSSD	(1)	811 MLRSSD	(1)
814 W-RSP	(1)	818 WLR5	(1)
819 MLRSSD	(1)	823 BLQSSD	(1)
826 W-RSS	(1)	830 BLRSS	(1)
831 BJJSD	(1)	835 BJJSD	(1)
838 BJJS	(1)	842 BKXSP	(1)
843 BKXSD	(1)	847 BAXSD	(1)
850 BKXSP	(1)	854 BKXS	(1)
855 BJELT2	(4)	860 GRIAS	(1)
851 GN	(1)	863 WNI	(1)
864 ML	(1)	866 MLXK2	(1)
857 MLJK1	(1)	869 WJK	(1)
870 WAK	(1)	872 WJK	(1)
873 WJK	(1)	875 GJK	(1)
876 KES	(1)	878 BBIAS	(1)
873 BAX	(1)	881 BKK	(1)
882 WAKSS	(1)	884 BKXSS	(1)
885 WHTS	(1)	889 WAK	(1)
893 WNS	(1)	903 STMP	(1)
904 WUPS	(1)	908 SNPM	(1)
911 SP4P	(1)	1551 UPMI	(1)
1552 UP51	(1)	1999 T	(1)

STATISTICS

PROGRAM LENGTH 3563 238
 CH BLANK COMMON LENGTH 73663 3830

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SUBROUTINE C2I
C**HELFFIRE-AUTOPILOT-INITIATION MODULE
C**LO4 FREQ. MODEL
COMMON C(3030)
5 DIMENSION IPL(100)
EQUIVALENCE (C(2561),N)
EQUIVALENCE (C(2552),IPL)
C
IPL(N) = 600
IPL(N+1) = 604
IPL(N+2) = 608
IPL(N+3) = 612
IPL(N+4) = 616
IPL(N+5) = 620
IPL(N+6) = 624
IPL(N+7) = 628
N = N+8
C(2662) = .J05
C(2663) = .005
C(2664) = .J05
C(803) = J.
C(807) = 0.
C(811) = 0.
C(815) = 0.
C(819) = 0.
C(823) = 0.
C(827) = 0.
C(831) = 0.
C( 811) = C( 861)
IF (C( 462)-GT-.8)-RETURN
C( 811) = C( 978) + C( 861)
C( 823) = C( 874)
RETURN
END

```

SYMBOLIC REFERENCE MAP (3+3)									
ENTRY POINTS		DEF LINE		REFERENCES					
1-C21		1		30		31			
VARIABLES	SM TYPE	REAL	ARRAY	RELOCATION	REFS				
0 C					DEFINED	4	6	7	29
					DEFINED	18	19	20	21
5001-IPL		INTEGER	ARRAY	/ /	REFS	26	27	28	29
					DEFINED	5	7	DEFINED	31
5000-N		INTEGER	/ /	/ /	REFS	14	15	16	17
					DEFINED	6	9	10	11
					DEFINED	15	17	DEFINED	13
COMMON BLOCKS LENGTH MEMBERS - BIAS NAME(LENGTH)									
/ / 3030 0 G (3030)									
EQUIV CLASSES LENGTH MEMBERS - BIAS NAME(LENGTH)									
C 3030 2560 N (1) 2561 IPL (100)									
STATISTICS									
PROGRAM LENGTH 368 30									
CM BLANK COMMON LENGTH 73663 3030									

Line	Code	Text	Address
63	C	EQUIVALENCE (C(825),BLQSSD)	93
		EQUIVALENCE (C(827),BLQSS)	94
		EQUIVALENCE (C(829),BLRSSD)	95
		EQUIVALENCE (C(831),BLRSS)	96
			97
			98
65	C	EQUIVALENCE (C(835),BOELTC)	99
			100
			101
			102
			103
			104
70	C	EQUIVALENCE (C(880),BXXS)	105
		EQUIVALENCE (C(881),BUJS)	106
		EQUIVALENCE (C(882),BKXS)	107
		EQUIVALENCE (C(883),BXSS)	108
		EQUIVALENCE (C(884),BUJS)	109
		EQUIVALENCE (C(885),BKXS)	110
		EQUIVALENCE (C(886),BPER)	111
		EQUIVALENCE (C(887),BPTIME)	112
75	C	IF (LT, WPTIME) WP=WP+MPER	113
		GO TO 114	114
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115      BPSDD = -(      - CPH1*WRD + SPH1*MPD)
      C
C**SUMMATION OF RATE PUMPING AND GUIDANCE SIGNALS AND THEIR DERIVATIVES
      8JJS = (BLRSS--BPS--) - (BLSSS--BTH )
      8JSD = (BLRSS--BPSD) - (MLRSS--BTHQ )
      8JSDO = (BLRSSD--BPSDO) - (MLRSSD--BTHDO)
      8KKS = (BLRSS--BPS ) - (BLSSS--BTH )
      8KSD = (BLRSS--BPSD-) - (MLRSS--BTHD )
      8KSDO = (BLRSSD--BPSDO) - (MLRSSD--BTHDO)
      C
125      C**GUIDANCE SIGNAL SHAPING AND LIMITING
      8XSS = GX*(1+BLXX2) + (MLX(1+BLXX2)*8KXSD)/(WLX1*WLX2) + 8XKS)
      8JSS = GJK*(8JJSDD + (MLJC(1+WLJK2)*8JSD)/(WLJK1*WLJK2) + 8JJS)
      8KSS = GJK*(1+BLKX2) + (MLJC(1+WLJK2)*8KXSD)/(WLJK1*WLJK2) + 8KKS)
      IF (ABS(8JJS) .GT. 1)K) 8JJS = SIGN(HJK,8JJS)
      IF (ABS(8KKS) .GT. 1)K) 8KKS = SIGN(HJK,8KKS)
      C
130      C**COMMANDS TO ACTUATORS
      8DELTC(1) = 8JJS + 3XSS
      8DELTC(2) = 8KKS + 3XSS
      8DELTC(3) = 9JJS - 3XSS
      8DELTC(4) = 8KKS - 3XSS
      RETURN
      END
      C**INITIALIZATION MODULE FOR HELFIRE SIMPLIFIED ACTUATOR
C***** NON - LINEAR MODEL *****
      C
140
175

```


VARIABLES	SM	TYPE	RELLOCATION	REFS	43	76	85	89
3717 T	REAL			REFS	43	76	85	89
1533 TOY	REAL			REFS	0	86	89	
716 TKRY	REAL			REFS	34	90		
715 TKRZ	REAL			REFS	33	86		
235 TPH2	REAL			REFS	110	111	DEFINED	105
237 TPS1	REAL			REFS	112	113	DEFINED	106
255 VAR	REAL		*UNDEF	REFS	5			
1540 WL	REAL			REFS	13	82	83	
622 WLAHQ	REAL			REFS	30	80	82	
626 WLAMR	REAL			REFS	31	81	83	
1543 WLJK1	REAL			REFS	16	2*127	2*128	
1544 WLJK2	REAL			REFS	17	2*127	2*128	
1446 WLQS	REAL			REFS	49	90	82	
1443 WLQSD	REAL			REFS	40	80	92	DEFINED 78
1437 WLQSD0	REAL			REFS	46	DEFINED	90	87
1442 WLQSP	REAL			REFS	47	74		
1452 WLQSS	REAL			REFS	21	95	37	119 122
1447 WLQSS0	REAL			REFS	50	120	123	DEFINED 95
1462 WLRS	REAL			REFS	35	81	83	
1457 WLRS0	REAL			REFS	54	81	83	DEF? MED 79
1453 WLRS00	REAL			REFS	52	DEFINED	81	91
1456 WLRS0	REAL			REFS	33	79		
1466 WLRS	REAL			REFS	37	96	98	119 122
1463 WLRS0	REAL			REFS	56	120	123	DEFINED 96
1541 WLXX1	REAL			REFS	14	2*126		
1542 WLXX2	REAL			REFS	15	2*126		
1537 WNI	REAL			REFS	12	95	96	
1536 WN2	REAL			REFS	11	2*80	2*81	
3312 WP	REAL			REFS	35	76	110	2*112 114
3307 WPO	REAL			DEFINED	76			
1571 WPERR	REAL			REFS	38	111	2*113	115
1572 WPTIME	REAL			REFS	73	76		
3316 WQ	REAL			REFS	36	110		
227 WQC	REAL			REFS	35	DEFINED	82	88 89
3313 WQ0	REAL			REFS	39	111		
3322 WR	REAL			REFS	37	110	112	114
230 WRC	REAL			REFS	36	DEFINED	83	92 93
3317 WR0	REAL			REFS	40	111	113	115
EXTERNALS	TYPE	ARCS	REFERENCES					
GOSD	REAL	1	101	104	105	106		
SINO	REAL	1	102	103	105	106		
INLINE FUNCTIONS	TYPE	ARCS	DEF LINE REFERENCES					
ABS	REAL	1	INTRIN	129	130			
SIGN	REAL	2	INTRIN	129	130			
STATEMENT LABELS	DEF LINE REFERENCES							
41 4	90	85						
50 5	34	85	90					
COMMON BLOCKS	LENGTH	MEMBERS - BIAS NAME(LENGTH)						
/ /	3830	3-C (3830)						

SUBROUTINE C2		74/74	OPTAL	FTN 4-2+75067	05/35/75	16-23-43	PAGE
EQUIV CLASSES	LENGTH	MEMBERS		BIAS NAME(LENGTH)			
C	3830	352 BPH1	(1)	353 BT42	(1)	354 BPS1	(1)
		392 BPH2	(1)	402 MLAMQ	(1)	406 MLAMR	(1)
		463 CAGE	(1)	451 TKR2	(1)	462 TKRY	(1)
		793 MLQSD	(1)	802 MLJSP	(1)	803 MLQSD	(1)
		805 M-25	(1)	807 MLSSD	(1)	810 MLQSS	(1)
		311 M-RSD	(1)	814 MLJSP	(1)	815 MLRSD	(1)
		316 M-RS	(1)	819 MLRSSD	(1)	822 MLRSS	(1)
		323 MLRSSD	(1)	825 BLRSS	(1)	827 BLRSSD	(1)
		830 BLRSS	(1)	835 BDCLTC	(4)	859 TOY	(1)
		353 J3IAS	(1)	851 GN	(1)	862 MN2	(1)
		363 MN1	(1)	854 ML	(1)	865 MLXX1	(1)
		365 M-XX2	(1)	857 MLK1	(1)	868 MLJK2	(1)
		859 MJK	(1)	874 GJK	(1)	875 GJK	(1)
		377 G3IAS	(1)	878 R3IAS	(1)	879 BXXS	(1)
		883 BJJS	(1)	881 BKCS	(1)	882 BXXSS	(1)
		883 BJJS	(1)	884 BKCS	(1)	889 WPER3	(1)
		892 MTIME	(1)	1735 WPD	(1)	1738 WP	(1)
		1733 W20	(1)	1742 W2	(1)	1743 WRD	(1)
		1746 W2	(1)	1939 T	(1)	3503 OPTM4	(1)
STATISTICS							
PROGRAM LENGTH		4223		274			
COMMON LENGTH		73653		3830			

C	ENTRY ALL	C4	59
60	C	C4	60
	C MONTE CARLO FIN MISALIGNMENT ERRORS	C4	61
C		C4	62
	FELECB = 0.	C4	63
	FELECB = 0.	C4	64
65	FELECB = 0.	C4	65
	FELECB = 0.	C4	66
	FMECHB = 0.	C4	67
	FMECHB = 0.	C4	68
	FMECHB = 0.	C4	69
70	DO 10 I = 1, 13512	C4	70
	100 = 1	C4	71
	IF (ISNXX(I) - E1.1250) CALL MCARLO (DUM, 1, 100)	C4	72
	IF (ISNXX(I) - E1.1251) CALL MCARLO (DUM, 1, 100)	C4	73
	IF (ISNXX(I) - E1.1252) CALL MCARLO (DUM, 1, 100)	C4	74
75	C MONTE CARLO FIN OFFSET (MODULE 341 AND C4)	C4	75
	IF (ISNXX(I) - E1.1247) CALL MCARLO (DUM, 1, 100)	C4	76
	IF (ISNXX(I) - E1.1248) CALL MCARLO (DUM, 1, 100)	C4	77
	IF (ISNXX(I) - E1.1249) CALL MCARLO (DUM, 1, 100)	C4	78
	DELTA = FELECB + FMECHB	C4	79
80	DELTA = FELECB + FMECHB	C4	80
	DELTA = FELECB + FMECHB	C4	81
	10 CONTINUE	C4	82
	BDL11 = -BJP + BDQ + BDR	C4	83
	BDL12 = -BJP + BDQ + BDR	C4	84
85	BDL13 = 3D2 + 3D3 + BDR	C4	85
	BDL14 = 3D2 + 3D3 + BDR	C4	86
	BDL11 = 8DELTA + DELTA + DELTA	C4	87
	BDL12 = 8DELTA + DELTA + DELTA	C4	88
	BDL13 = 8DELTA + DELTA + DELTA	C4	89
90	BDL14 = 8DELTA + DELTA + DELTA	C4	90
	RETURN	C4	91
	END	C4	92
	C** HELFIRE SIMPLIFIED ACTUATOR 10DEL	C4	93
	C***** NON - LINEAR MODEL *****	C4	94
C		C4	95

SYMBOLIC REFERENCE MAP (2-3)									
ENTRY POINTS	DEF LINE	REFERENCES							
50-ALI	59	30							
1 C4I	1	30	57						
VARIABLES	SM	TYPE	RELOCATION						
150-BOELT	REAL	RUMBER		REFS	5	6	86	DEFINED	82
2116-BOELT1	REAL	RUMBER		REFS	6	7	87	DEFINED	83
2122-BOELT2	REAL	RUMBER		REFS	7	8	88	DEFINED	84
2126-BOELT3	REAL	RUMBER		REFS	8	9	89	DEFINED	85
2132-BOELT4	REAL	RUMBER		REFS	9	10	90	DEFINED	86
2316-80P	REAL	RUMBER		REFS	20	21	82	83	84
2317-80Q	REAL	RUMBER		REFS	21	22	82	83	84
2320-80R	REAL	RUMBER		REFS	22	23	82	83	84
0-C	REAL	ARRAY		REFS	11	12	13	14	15
				REFS	19	20	21	22	23
				DEFINED	40	41	42	43	44
				REFS	47	48	49	50	51
2345-DELTB	REAL	RUMBER		REFS	16	17	86	87	88
2346-DELTQB	REAL	RUMBER		REFS	17	18	86	87	88
2347-DELTRB	REAL	RUMBER		REFS	18	19	86	87	88
147-DUM	REAL	RUMBER		REFS	71	72	73	75	76
2336-FELECB	REAL	RUMBER		REFS	10	11	78	DEFINED	63
2337-FELECB	REAL	RUMBER		REFS	11	12	79	DEFINED	64
2340-FELECB	REAL	RUMBER		REFS	12	13	80	DEFINED	65
2341-FMECHB	REAL	RUMBER		REFS	13	14	78	DEFINED	66
2342-FMECHB	REAL	RUMBER		REFS	14	15	79	DEFINED	67
2343-FMECHB	REAL	RUMBER		REFS	15	16	80	DEFINED	68
145-I	INTEGER	RUMBER		REFS	70	71	72	73	75
146-IO	INTEGER	RUMBER		REFS	71	72	73	75	76
5001-IPL	INTEGER	ARRAY		REFS	3	24	DEFINED	25	26
				REFS	31	32	33	34	35
7661-ISHDX	INTEGER	ARRAY		REFS	49	50	51	52	53
6667-I35.2	INTEGER	RUMBER		REFS	4	5	59	60	61
5000-M	INTEGER	RUMBER		REFS	23	24	25	26	27
				REFS	32	33	34	35	36
				REFS	48	49	50	51	52
2163-OP1ACI	REAL	RUMBER		REFS	19	20	21	22	23
EXTERNALS	TYPE	ARGS	REFERENCES	71	72	73	75	76	77
MCARLO		3							
STATEMENT LABELS	DEF LINE	DEF LINE	REFERENCES	81	82	83	84	85	86
0-10									

LOOPS LABEL INDEX FROM-TO LENGTH PROPERTIES EXT REFS
60 10 1 69 01 428

COMMON BLOCKS LENGTH MEMBERS - BIAS NAME(LENGTH)
/ / 3830 0 C (3830)

EQUIV. CLASSES	LENGTH	MEMBERS - BIAS NAME(LENGTH)
C	3830	1102 BDELT1 (1)
		1114 BDELT1 (1)
		1231 BDR (1)
		1247 FELECB (1)
		1250 FMECHB (1)
		1254 DELYQB (1)
		2561 LPL (100)
		1106 BDELT2 (1)
		1139 OPTACT (1)
		1232 BJR (1)
		1248 FE-ECRB (1)
		1251 FE-ECRB (1)
		1255 DE-TRB (1)
		3511 I3312 (1)
		1110 BDELT3 (1)
		1230 BOP (1)
		1246 FELECB (1)
		1249 FMECHB (1)
		1253 DELTB (1)
		2560 N (1)
		3633 ISMOX (40)

STATISTICS

PROGRAM LENGTH	1543	103
CM BLANK COMMON LENGTH	73663	3830


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60      WDS(3) = C(1177)
        WDS(4) = C(1184)
        WDS(5) = C(1186)
        WDS(6) = C(1173)
        WDS(7) = C(1180)
        WDS(8) = C(1187)
        WDS(9) = C(1183)
        WDS(10) = C(1123)
        WDS(11) = C(1127)
        WDS(12) = C(1131)

        C
        C**ACTUATOR DYNAMICS
        XF=0.
        CHO=FIATPI/MACH*CB2*CHDF*W22*XF*3MC4D)
        DO 30 I=1,4
            UNS = PDYNMC*RFAREA
            UQSL = UQS*ZFLSTM
            FMHD = C40*UQSL*12.
            M1 = MUEL
            M2 = M1*2.
            IF (I.GE.2 .AND. I.LE.3) GO TO 5
            M2 = M1
            M1 = M1*2.
            5 CONTINUE
            A1 = (BOELT(I) - BOELT(I))
            AIS = A1 - SIGN(A1, A1)
            IF (ABS(A1) .LE. 34) AIS = 0.
            A2 = C1/CR*A15
            IF (A2 .LT. -M2) A2 = -M2
            IF (A2 .GT. M1) A2 = M1
            BOSO(I) = A1*(A2 - BOS(I))
            BDE = BOSO(I) + .2*FMHD*BOELT(I)
            WDSO(I) = 4N*(M1*(BDE - WDS(I)) - 2.*ZN*WDSO(I))
            BOELT(I) = WDSO(I)/M1 + WDS(I)
            IF (OPTACT .LE. J.)
                * BOELT(I) = (A2 - G2*FMHD*BOELT(I))/(1.+G2*FMHD)/M1
        C** RATE LIMIT
        C** SURECE POSITION LIMITER
        IF (ABS(BOELT(I)) .GT. 19.) A40 = (BOELT(I) - GT.G.) BOELT(I)
        * = 0.
        30 CONTINUE

        C
        C** OUTPUT DERIVATIVES OF STATE VARIABLES TO INTEGRATION
        C(1103) = BOELT(1)
        C(1107) = BOELT(2)
        C(1111) = BOELT(3)
        C(1115) = BOELT(4)

        C
        C(1100) = BOELT(1)
        C(1104) = BOELT(2)
        C(1108) = BOELT(3)
        C(1112) = BOELT(4)
        C(1116) = WDSO(1)
        C(1174) = WDSO(2)
        C(1181) = WDSO(3)
        C(1116) = WDSO(4)
    
```


SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS		DEF LINE	REFERENCES	1-64		119	
VARIABLES		SN	TYPE	RELOCATION			
211	A1	REAL		REFS	2*03	84	DEFINED
212	A1S	REAL		REFS	35	DEFINED	83
213	A2	REAL		REFS	86	87	86
214	BDE	REAL		87			88
2171	BDELH	REAL	//	REFS	30	DEFINED	89
221	BDELT	REAL	ARRAY	REFS	12		
1527	BDELTC	REAL	ARRAY	REFS	4	82	89
215	BDELTD	REAL	ARRAY	REFS	102	DEFINED	52
406	BDS	REAL	ARRAY	REFS	4	29	40
412	BDSO	REAL	ARRAY	REFS	48	49	50
2177	BH	REAL	ARRAY	REFS	4	50	51
0	C	REAL	ARRAY	REFS	4	96	106
				REFS	31	92	107
				REFS	5	88	89
				REFS	67		DEFINED
				REFS	5	116	115
				REFS	88		117
				REFS	18	83	84
				REFS	3	10	11
				REFS	17	18	19
				REFS	27	28	30
				REFS	35	36	39
				REFS	53	55	57
				REFS	61	63	64
				REFS	52	54	56
				REFS	100	101	102
				REFS	110	111	112
				REFS	7	71	DEFINED
				REFS	75	DEFINED	71
				REFS	7	71	DEFINED
				REFS	11	85	
				REFS	30	48	49
				REFS	31	48	50
				REFS	32	48	50
				REFS	40	48	50
				REFS	16	89	2*92
				REFS	33	DEFINED	75
				REFS	34		
				REFS	35		
				REFS	36		
				REFS	17	85	
				REFS	20	89	2*92
				REFS	13	76	
				REFS	21	77	79
				REFS	76	80	2*87
				REFS	22	2*86	DEFINED
				REFS	2*78	2*82	2*88
				REFS	4*96	DEFINED	72
				REFS	6	62	
				REFS	41		
				REFS	7	71	DEFINED
				REFS	10	92	
5001	IPL	INTEGER	ARRAY				
5000	N	INTEGER					
416	NC2	INTEGER	ARRAY				
2163	OPTACT	REAL					
	</						

VARIABLES	SM	TYPE	RELOCATION	27	73	73
312 POYMC	REAL	/ /	REFS	27	73	73
2431 RFAREA	REAL	/ /	REFS	23	73	73
2432 RFLGTH	REAL	/ /	REFS	24	74	74
3717 T	REAL	/ /	REFS	39		
207 UQS	REAL	/ /	REFS	74	DEFINED 73	
210 UQSL	REAL	/ /	REFS	75	DEFINED 74	
275 VAR	REAL	*UNDEF	REFS	4		
313 VMACH	REAL	/ /	REFS	28	71	
372 WDS	REAL	ARRAY	REFS	5	90	91
				63		DEFINED 50
376 WUSD	REAL	ARRAY	REFS	5	90	91
				59		DEFINED 56
402 WSDSD	REAL	ARRAY	REFS	5	110	111
				90		112
2800 WN	REAL	/ /	DEFINED	19	290	
2173 W1	REAL	/ /	REFS	14	80	92
204 XF	REAL	/ /	REFS	71	DEFINED 70	
2174 ZN	REAL	/ /	REFS	15		

EXTERNALS TYPE ARGS REFERENCES
FINTP1 REAL 6 71

INLINE FUNCTIONS TYPE ARGS DEF LINE REFERENCES
ABS REAL 1 INTRIN 84 36
SIGN REAL 2 INTRIN 83

STATEMENT LABELS DEF LINE REFERENCES
73-5 81 76
0 30 98 72

LOOPS LABEL INDEX FROM-TO LENGTH PROPERTIES
55-30 1 72-98 658 OPT

COMMON-BLOCKS LENGTH MEMBERS BIAS-NAME(LENGTH)
/ / 3830 0 C (3830)

EQUIV CLASSES LENGTH MEMBERS BIAS-NAME(LENGTH)
C 3830
202 POYMC (1) 855 BOELTC (4)
1139 OPTAG (1) 1144 C2 (1) 1145 BDELH (1)
1146 BDEL (1) 1147 W1 (1) 1148 ZN (1)
1149 FMD (1) 1150 G1 (1) 1151 BM (1)
1152 MN (1) 1153 G2 (1) 1154 W1 (1)
1155 M2 (1) 1253 DE-78 (1) 1254 DELTQB (1)
1255 UELTR3 (1) 1305 RFAREA (1) 1306 RFLGTH (1)
1308 FWH1 (1) 1309 FWH2 (1) 1310 FWH3 (1)
1311 FWH4 (1) 1939 T (1) 2012 DOC (1)
2560 M (1) 2561 IP (101)

STATISTICS
PROGRAM LENGTH 4363 286
CM BLANK COMMON LENGTH 7363 3830

```

SUBROUTINE G4
C*****
C* THIS IS A SUBROUTINE (NOT A MODULE) CALLED BY STAGE 3 **
C** STOPS PROGRAM AND COMPUTES MISS DISTANCE
C*****
5 COMMON C(1630)
100 FORMAT(140,174 MISS DISTANCE = ,1PE15.7/
140,174 FLIGHT TIME = ,1PE15.7/
200 FORMAT(140, 9X,84RDE,X = ,1PE15.7, 8X,84RDELY = ,1PE15.7,
300 FORMAT(140,4X,84RDELY = ,1PE15.7, 8X,84RDELY = ,1PE15.7)
EQUIVALENCE (C(1357),BCAMH)
*
* (C(1358),BCAMV)
* (C(1371),RANGE)
* (C(1385),RDELX)
* (C(1435),RDELY)
* (C(1537),RDELZ)
EQUIVALENCE (C(2000),T)
EQUIVALENCE (C(1564),YMC1)
EQUIVALENCE (C(1555),YMC2)
EQUIVALENCE (C(1574),ZMC1)
EQUIVALENCE (C(1575),ZMC2)
*
* (C(2020),LCONV)
EQUIVALENCE (C(1300),RMISS)
*
* (C(1311),R)
* (C(1302),RYF)
* (C(1303),RZF)
EQUIVALENCE (C(1311),LCEP)
EQUIVALENCE (C(13721),ITCI)
LCEP = 0
IF (RANGE .GT. 500.1 GO TO 20
UC13 = SINQ(8.5AMV)
UC33 = COSQ(8.5AMV)
UC21 = SINQ(8.5AMV)
UC22 = COSQ(8.5AMV)
UC11 = UC22*UC33
UC12 = -UC21*UC33
UC31 = -UC22*UC13
UC32 = UC21*UC13
RXFP = UC11*RDELX + UC12*RDELY + UC13*RDELZ
RYFP = UC21*RDELX + UC22*RDELY
RZFP = UC31*RDELX + UC32*RDELY + UC33*RDELZ
IF (RXFP .GT. 0.1 GO TO 10
PCT = RXFP/RXFP + UKFPI
RUX = UDELX - PCT*(RDELX - JOELX)
ROZ = UDELZ - PCT*(RDELY - JOELZ)
RDELY = UDELZ - PCT*(RDELZ - JOELZ)
RYF = UYFP - PCT*(RYFP - UYFP)
RZF = UZFP - PCT*(RZF - UZFP)
TZERO = UT - PCT*(T - UT)
RMISS = SQR(RYF**2 + RZF**2)
PITCH=10H PITCH
YAW=10H YAW
WRITE(6,600)C(1530),PITCH
WRITE(6,500)C(1531),YAW
55 FORMAT(140,50X,*,**MAX BREAKLOCK VALUE =*F10.5,* IN *A10)
600 WRITE(6,400)

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```

400 FORMAT(1H0,13HUV NJ4BER = ,I2)
      IF(1CTALE.3)50 TO 31
      CALL MCARLX(10H,2,RNSTR1)
      WRITE(6,500) C(1557), C(1561), C(1577), C(1578)
      XMCSPOT = SRT((YMC2+ZMC2) + ZMC2*ZMC2)
      WRITE(6,2555)YMC,YMC2
      WRITE(6,2556)ZMC,ZMC2,XMCSPOT
30 CONTINUE
500 FORMAT(1H0,11X,13HMAX SPOT Y = ,F6.2,14H MIN SPOT Y = ,F6.2/
      1 12X,13HMAX SPOT Z = ,F6.2,14H MIN SPOT Z = ,F6.2//
      2 )
2,55 FORMAT(1H0,11X,25HSAMPLE SPOT JITTER Y-MEAN=,F10.5,6X,12HMEAN SQUA
      1RE=F10.5)
2556 FORMAT(1H0,11X,25HSAMPLE SPOT JITTER Z-MEAN=,F10.5,6X,12HMEAN SQUA
      1RE=F10.5,6X,18HSPOT RADIAL RMS = ,F10.5)
      WRITE(6,100) RM1SS, IZERO
      WRITE(6,200) ROK, ROK, ROK
      WRITE(6,300) RYF, RZF
      LGONV = 2
      LCEP = 1
      RETURN
16 UT = T
      UDELX = RDELX
      UDELY = RDELY
      UDELZ = RDELZ
      UXFP = RYFP
      UYFP = RYFP
      UZFP = RZFP
      RETURN
20 IF (RDELZ .LT. 0.) LGONV = 2
      RETURN
      END

```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES	78	83	88
1 G4	1				
VARIABLES SN TYPE RELOCATION					
544 BGAMH	REAL	/ /			12 34 35
545 BGAMV	REAL	/ /			12 32 33
0 C	REAL	ARRAY / /			6*12 18 19 20 21 2*22
371 DUM	* REAL				28 29 54 55 4*61
7210 IICI	INTEGER	/ /			59
454 L	INTEGER	/ /			57
36 LCEP	INTEGER	/ /			DEFINED 30 77
3743 LCONV	INTEGER	/ /			DEFINED 76 87
353 PCI	REAL				46 47 48 49 50
367 PITCH	REAL				DEFINED 52
562 RANGE	REAL	/ /			31 40 41 42 45 80
3142 ROELX	REAL	/ /			40 41 42 46 81
3143 ROELY	REAL	/ /			40 42 47 82 87
3144 ROELZ	REAL	/ /			DEFINED 45
355 ROX	REAL				DEFINED 46
357 ROY	REAL				DEFINED 47
361 ROZ	REAL				DEFINED 73
453 RMISS	REAL	/ /			DEFINED 51
372 RNSRT	* REAL				44 63 DEFINED 40
350 RXFP	REAL	/ /			51 75 DEFINED 48
455 RYF	REAL	/ /			84 75 DEFINED 41
351 RYFP	REAL	/ /			51 75 DEFINED 49
456 RZF	REAL	/ /			85 DEFINED 42
352 RZFP	REAL	/ /			50 79
3717 T	REAL	/ /			DEFINED 50
365 TZERO	REAL				DEFINED 36
344 UC11	REAL				DEFINED 37
345 UC12	REAL				DEFINED 39
340 UC13	REAL				DEFINED 40
342 UC21	REAL				DEFINED 38
343 UC22	REAL				DEFINED 39
346 UC31	REAL				DEFINED 36
347 UC32	REAL				DEFINED 42
341 UC33	REAL				DEFINED 37
356 UDELX	REAL				2*45 DEFINED 80
360 UDELY	REAL				2*46 DEFINED 81
362 UDELZ	REAL				2*47 DEFINED 92
366 UT	REAL				2*50 DEFINED 79
354 UXFP	REAL				2*44 DEFINED 83
363 UYFP	REAL				2*48 DEFINED 84
364 UZFP	REAL				2*49 DEFINED 85
373 XMGSP01	REAL				64 DEFINED 52
370 YAH	REAL				55 DEFINED 53
3033 YMC	REAL	/ /			19 63
3634 YMC2	REAL	/ /			20 2*62 63
3045 ZMC	REAL	/ /			21 54
3046 ZMC2	REAL	/ /			22 2*62 64

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES	1	78	85	88
1 G4						
VARIABLES	SN	TYPE	RELOCATION			
544 BGAMH	REAL	//	REFS	12	34	35
545 BGAMV	REAL	//	REFS	12	32	33
0 C	REAL	ARRAY	REFS	5	5*12	18
			REFS	28	29	54
371 OUM	* REAL		REFS	60		4*61
7210 ITCT	INTEGER	//	REFS	29	59	
454 L	INTEGER	//	REFS	24	57	
36 LCEP	INTEGER	//	REFS	27	DEFINED	30
3743 LCONV	INTEGER	//	REFS	22	DEFINED	76
353 PC1	REAL		REFS	45	46	47
			DEFINED	44		48
367 PITCH	REAL		REFS	54	DEFINED	52
562 RANGE	REAL	//	REFS	12	31	
3142 ROELX	REAL	//	REFS	12	40	41
3143 ROELY	REAL	//	REFS	12	40	42
3144 ROELZ	REAL	//	REFS	12	40	41
355 ROX	REAL		REFS	74	DEFINED	42
357 ROY	REAL		REFS	74	DEFINED	45
361 ROZ	REAL		REFS	74	DEFINED	46
453 RMISST	REAL	//	REFS	24	73	DEFINED
372 RNSRT	* REAL		REFS	50		51
350 RXFP	REAL	//	REFS	43	44	83
455 RYF	REAL	//	REFS	24	51	DEFINED
351 RYFP	REAL		REFS	48	54	DEFINED
456 RZF	REAL	//	REFS	24	51	DEFINED
352 RZFP	REAL		REFS	49	85	DEFINED
3717 T	REAL	//	REFS	18	50	79
365 TZERO	REAL		REFS	73	DEFINED	50
344 UC11	REAL		REFS	40	DEFINED	36
345 UC12	REAL		REFS	40	DEFINED	37
340 UC13	REAL		REFS	38	39	40
342 UC21	REAL		REFS	37	39	41
343 UC22	REAL		REFS	36	38	41
346 UC31	REAL		REFS	42	DEFINED	38
347 UC32	REAL		REFS	42	DEFINED	39
341 UC33	REAL		REFS	36	37	42
356 UDELX	REAL		REFS	2*45	DEFINED	80
360 UDELY	REAL		REFS	2*46	DEFINED	81
362 UDELZ	REAL		REFS	2*47	DEFINED	82
366 UT	REAL		REFS	2*50	DEFINED	79
354 UXFP	REAL		REFS	2*44	DEFINED	83
363 UYFP	REAL		REFS	2*48	DEFINED	84
364 UZFP	REAL		REFS	2*49	DEFINED	85
373 XMCSPOT	REAL		REFS	64	DEFINED	52
370 YAH	REAL		REFS	55	DEFINED	53
3033 YMC	REAL	//	REFS	19	63	
3034 YMC2	REAL	//	REFS	20	2*62	63
3045 ZMC	REAL	//	REFS	21	64	
3046 ZMC2	REAL	//	REFS	22	2*62	64

SUBROUTINE C4										74724 OPT=1										FIN 4.2+75057 -05/05/75-16.23.53. PAGE 4									
FILE NAMES										MODE																			
1 TAPE6										FMT																			
										ARIES										54 55 57 61 63 64 73 74									
										75																			
EXTERNALS										TYPE										ARGS									
										REAL										1 35									
1 GOSO										REAL										1 35									
1 MCARLX										REAL										3 63									
1 SIND										REAL										1 32 34									
1 LIBRARY										REAL										1 51 62									
STATEMENT LABELS										DEF LINE										REFERENCES									
1427 110										79										43									
1441 20										87										31									
116 30										53										53									
155 100										FMT										7 73									
169 1200										FMT										9 74									
175 1300										FMT										11 75									
230 1400										FMT										58 57									
256 1500										FMT										56 51									
215 1600										FMT										55 54									
271 17555										FMT										53 61									
301 12556										FMT										71 54									
COMMON BLOCKS										LENGTH										MEMBERS - BIAS NAME(LENGTH)									
										3830										3830									
EQUIV CLASSES										LENGTH										MEMBERS - BIAS NAME(LENGTH)									
										3830										3830									
										301 RYZ										239 RHSS (1) 300 L (1)									
										357 RGAHV										302 RZF (1) 356 BGAMM (1)									
										1564 YMC2										370 RANGE (1) 1563 YMC (1)									
										1634 ROELK										1573 ZMC (1) 1574 ZMC2 (1)									
										1933 R										1635 ROELY (1) 1636 RDELZ (1)									
																				2019 LCCNV (1) 3720 ITCT (1)									
STATISTICS										PROGRAM LENGTH										3743 252									
										COMMON LENGTH										73663 3830									


```

SUBROUTINE AMRK(AJXSJB)
COMMON C(3030)
DIMENSION CSAV(110), IPL(101)
REAL K1(100), K2(100), K3(100), K4(100)
EQUIVALENCE C(2000), T
EQUIVALENCE C(2664), DELT
EQUIVALENCE C(2561), NJ
EQUIVALENCE C(2352), IPL
EQUIVALENCE C(1975), XNORK
XNORK = -1.
DO 1 I = 1, IJ
J = IPL(I)
C
C***STORE INITIAL VALUES
CSAV(I) = C(J+3)
C
C*** COMPUTE K1
K1(I) = DELT*C(J)
1 C(J+3) = CSAV(I) + .5*K1(I)
T = T + .5*DELT
CALL AUXSJB
C
C*** COMPUTE K2
DO 2 I = 1, NJ
J = IPL(I)
K2(I) = DELT*C(J)
2 C(J+3) = CSAV(I) + .5*K2(I)
CALL AUXSJB
C
C*** COMPUTE K3
DO 3 I = 1, NJ
J = IPL(I)
K3(I) = DELT*C(J)
3 C(J+3) = CSAV(I) + K3(I)
T = T + .5*DELT
CALL AUXSJB
C
C*** COMPUTE K4
DO 4 I = 1, NJ
J = IPL(I)
K4(I) = DELT*C(J)
4 C(J+3) = CSAV(I) + K4(I)/6.
XNORK = 1.
CALL AUXSJB
RETURN
END

```

CARD NR. SEVERITY DETAILS DIAGNOSIS OF PROBLEM

19	I	NJ	THIS STATEMENT MAY REDEFINE A CURRENT LOOP CONTROL VARIABLE OR PARAMETER.
27	I	NJ	THIS STATEMENT MAY REDEFINE A CURRENT LOOP CONTROL VARIABLE OR PARAMETER.
34	I	NJ	THIS STATEMENT MAY REDEFINE A CURRENT LOOP CONTROL VARIABLE OR PARAMETER.
42	I	NJ	THIS STATEMENT MAY REDEFINE A CURRENT LOOP CONTROL VARIABLE OR PARAMETER.

26	CALL G5I	AMRK	105
	GO TO 1	AMRK	106
60	27 CALL G6I	AMRK	107
	GO TO 1	AMRK	108
	28 CALL S1I	AMRK	109
	GO TO 1	AMRK	110
	29 CAL S2I	AMRK	111
65	GO TO 1	AMRK	112
	30 CALL S3I	AMRK	113
	GO TO 1	AMRK	114
	31 CALL S4I	AMRK	115
	GO TO 1	AMRK	116
70	32 CALL S5I	AMRK	117
	GO TO 1	AMRK	118
	33 CALL S6I	AMRK	119
	GO TO 1	AMRK	120
75	34 CALL S7I	AMRK	121
	GO TO 1	AMRK	122
	35 CALL S8I	AMRK	123
	GO TO 1	AMRK	124
	36 CALL S9I	AMRK	125
	GO TO 1	AMRK	126
80	37 CALL S10I	AMRK	127
	1 CONTINUE	AMRK	128
	RETURN	AMRK	129
	END	AMRK	130

SYMBOLIC REFERENCE MAP (3+3)

ENTRY POINTS	DEF LINE	REFERENCES
1 AUX1	1	82

VARIABLES	SM	TYPE	RELOCATION	DEF LINE	REFERENCES
0 C	REAL	ARRAY	11		
171 I	INTEGER			2	3*3
172 L	INTEGER			7	DEFINED
5000 M	INTEGER			8	DEFINED
4470 N	INTEGER			3	DEFINED
4471 XHODNO	REAL	ARRAY	11	3	5
				3	4
				3	7

EXTERNALS	TYPE	ARGS	REFERENCES
A11		0	10
A21		0	12
A31		0	14
A41		0	15
A51		0	13
C11		0	21
C101		0	39
C21		0	22
C31		0	24
C41		0	25
C51		0	28
C61		0	31
C71		0	32
C81		0	34
C91		0	35
D11		0	43
D21		0	42
D31		0	44
D41		0	45
D51		0	43
G11		0	51
G21		0	52
G31		0	54
G41		0	55
G51		0	53
G61		0	51
S11		0	62
S101		0	81
S21		0	64
S31		0	65
S41		0	65
S51		0	71
S61		0	72
S71		0	74
S81		0	75
S91		0	75

STATEMENT LABELS	DEF LINE	REFERENCES
166 1	81	5
		25
		27
		43
		61
		63
		73
		11
		29
		47
		65
		8
		13
		15
		17
		19
		21
		23
		31
		33
		35
		37
		39
		41
		45
		53
		55
		57
		59
		71
		73
		75
		77

SUBROUTINE AUX1 74774 OPT=1

STATEMENT LABELS DEF LINE REFERENCES

57	2	10	8
61	3	12	3
63	4	14	3
65	5	16	3
67	6	18	3
71	7	20	3
73	8	22	3
75	9	24	3
77	10	26	3
101	11	28	3
103	12	30	3
105	13	32	3
107	14	34	3
111	15	36	3
113	16	38	3
115	17	40	3
117	18	42	3
121	19	44	3
123	20	46	3
125	21	48	3
127	22	50	3
131	23	52	3
133	24	54	3
135	25	56	3
137	26	58	3
141	27	60	3
143	28	62	3
145	29	64	3
147	30	66	3
151	31	68	3
153	32	70	3
155	33	72	3
157	34	74	3
161	35	76	3
163	36	78	3
165	37	80	3

DOOPS LABEL INDEX FROM-TO LENGTH PROPERTIES EXT REFS

4	1	6	81	1658	
COMMON BLOCKS					
/ /		LENGTH	MEMBERS - BIAS NAME(LENGTH)		
		383C	3 C		

EQUIV CLASSES LENGTH MEMBERS - BIAS NAME(LENGTH)

C	3830	2363	NOMOD (1)	2351	XMOJND (99)	2560	N (11)
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STATISTICS

PROGRAM LENGTH		1733	123
CM BLANK COMMON LENGTH		73663	3830

10

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
1 AUXSUB	1	13
VARIABLES	SN	TYPE
0 C	REAL	RELOCATION
5147 DER	ARRAY	// REFS
172 I	INTEGER	// REFS
5061 IPL	INTEGER	// REFS
173 L	INTEGER	// REFS
3743 LGONV	INTEGER	// REFS
5000 N	INTEGER	// REFS
4470 NOMOD	INTEGER	// REFS
3717 T	REAL	// REFS
5624 VAR	REAL	// REFS
4471 XMODNO	REAL	// REFS
EXTERNALS	TYPE	ARCS REFERENCES
A1	C	17
A2	C	19
A3	C	11
A4	C	23
A5	C	25
C1	C	27
C10	C	45
C2	C	29
C3	C	31
C4	C	33
C5	C	35
C6	C	37
C7	C	39
C8	C	41
C9	C	43
O1	C	47
O2	C	49
O3	C	51
O4	C	53
O5	C	55
G1	C	57
G2	C	59
G3	C	61
G4	C	63
G5	C	65
G6	C	67
S1	C	69
S10	C	71
S2	C	73
S3	C	75
S4	C	77
S5	C	79
S6	C	81
S7	C	83
S8	C	85
S9	C	87

STATEMENT LABELS	DEF LINE	REFERENCES	15	18	20	22	24	26	28	30
167 1	00	12	15	36	38	40	42	44	46	48
		32	34	56	58	60	62	64	66	68
		57	59	72	74	76	78	80	82	84
		69	70							
		85								
60 2	17	13								
62 3	19	13								
64 4	21	13								
66 5	23	13								
70 6	25	13								
72 7	27	13								
74 8	29	13								
76 9	31	13								
100 10	33	13								
102 11	35	13								
104 12	37	13								
106 13	39	13								
110 14	41	13								
112 15	43	13								
114 16	45	13								
116 17	47	13								
120 18	49	13								
122 19	51	13								
124 20	53	13								
126 21	55	13								
130 22	57	13								
132 23	59	13								
134 24	61	13								
136 25	63	13								
140 26	65	13								
142 27	67	13								
144 28	69	13								
146 29	71	13								
150 30	73	13								
152 31	75	13								
154 32	77	13								
156 33	79	13								
160 34	81	13								
162 35	83	13								
164 36	85	13								
166 37	87	13								

LOOPS LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES	EXT REFS	EXITS
3 1	1	12 88	1678			

COMMON BLOCKS	LENGTH	MEMBERS	BIAS NAME(LENGTH)
/ /	3830	3 0	(3830)

EQUIV CLASSES	LENGTH	MEMBERS	BIAS NAME(LENGTH)
C	3830	1399 1	(1)
		2361 XMODNO (99)	
		2663 DER (131)	
		2019 LCONV (1)	2360 NOMOD (1)
		2560 N (1)	2561 IPL (100)
		2964 VAR (101)	

STATISTICS	PROGRAM LENGTH	1743	124
CM BLANK COMMON LENGTH	73663	3830	


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      SUBROUTINE OINPT1
      COMMON C(3030)
      EQUIVALENCE (C(3219),ONAME1), (C(3260),ONAME2), (C(3318),ONAME3),
      C(3320),ONAME4), (C(2361),NOMOD1), (C(2362),NOMOD2),
      C(3440),NORNDM), (C(3441),RNDMNO), (C(3167),NOUT1),
      C(3168),NOUT2), (C(2461),NOSUB), (C(2462),SUSNO1),
      C(3339),NOSTAT),
      C(3330),LOSTAT), (C(3340),STATNO), (C(3066),NOLIST1),
      C(3057),LISTNO), (C(3117),NVALUE), (C(2008),PLOTNO),
      C(2009),NPLLOT), (C(2325),NLABE), (C,K)
      EQUIVALENCE (C(2010), STEPI)
      EQUIVALENCE (C(1984),NPLLOT)
      EQUIVALENCE (C(1985),OUTPLT)
      EQUIVALENCE (C(3512),ISGCT), (C(3514),SIGMA), (C(3554),SIGL3),
      C(3594),SIGUB), (C(3534),ISNOX), (C(3574),IDIST), (C(3511),RNSTRT),
      EQUIVALENCE (C(3721),ITCT), (C(3723),TPSGMA), (C(3733),TLB),
      C(3743),TUB), (C(3753),ITND), (C(3763),ITDIST), (C(3773),TSPER),
      C(3783),TTPPER), (C(3793),TSPSIG), (C(3803),TNXST), (C(3813),ITNDX2)
      EQUIVALENCE (C(211),EBVNSH)
      EQUIVALENCE (C(221),IPLDT)
      EQUIVALENCE (C(19),PSIZE)
      EQUIVALENCE (C(23),KLAN3D)
      EQUIVALENCE (C(24),KSSIG)
      EQUIVALENCE (C(25),SEPSIG)
      EQUIVALENCE (C(3025), NCASE)
      DIMENSION ONAME3(10),ONAME4(10)
      DIMENSION LISTNO(50), VALUE(50)
      DIMENSION SUBNO(33),IR(4),VR(4)
      DIMENSION ALPHA(3),ONAME1(5),ONAME2(50),OUTNO(50),MODNO(99)
      DIMENSION K(3510)
      DIMENSION STATNO(100)
      DIMENSION VLABLE(2,13)
      DIMENSION OUTPLT(15)
      DIMENSION SIGMA(40),SIGL8(4),SIGUB(40),ISNOX(40),IDIST(40)
      DIMENSION ISGMA(10),TLB(10),TUB(10),ITNDX(10),ITDIST(10),
      TSPER(13),TTPPER(10),TPSIG(10),ITNDX2(13),TNXST(10)
      DIMENSION SEPSIG(5)
      INTEGER SEPSIG
      REAL KSSIG
      REAL MODNO
      INTEGER OUTNO
      INTEGER RNDMNO
      INTEGER STATNO
      INTEGER OUTPLT
      DATA CFERTY/104
      DATA SSS/10MS
      JAR = 0
      WRITE(6,J1)
      31 FORMAT(11,11,INPUT DATA/1)
      1 READ(5,2)IR(1),IR(2),IR(3),IR(4),IR(5),IR(6),IR(7),IR(8),IR(9),IR(10),IR(11),IR(12),IR(13),IR(14),IR(15),IR(16),IR(17),IR(18),IR(19),IR(20),IR(21),IR(22),IR(23),IR(24),IR(25),IR(26),IR(27),IR(28),IR(29),IR(30),IR(31),IR(32),IR(33),IR(34),IR(35),IR(36),IR(37),IR(38),IR(39),IR(40),IR(41),IR(42),IR(43),IR(44),IR(45),IR(46),IR(47),IR(48),IR(49),IR(50),IR(51),IR(52),IR(53),IR(54),IR(55),IR(56),IR(57),IR(58),IR(59),IR(60),IR(61),IR(62),IR(63),IR(64),IR(65),IR(66),IR(67),IR(68),IR(69),IR(70),IR(71),IR(72),IR(73),IR(74),IR(75),IR(76),IR(77),IR(78),IR(79),IR(80),IR(81),IR(82),IR(83),IR(84),IR(85),IR(86),IR(87),IR(88),IR(89),IR(90),IR(91),IR(92),IR(93),IR(94),IR(95),IR(96),IR(97),IR(98),IR(99),IR(100))
      *VR(1),VR(2),VR(3),VR(4),VR(5)
      IF(EOF(5)) 50,55
      55 CONTINUE
      WRITE(6,J3)IR(1),IR(2),IR(3),IR(4),IR(5),IR(6),IR(7),IR(8),IR(9),IR(10),IR(11),IR(12),IR(13),IR(14),IR(15),IR(16),IR(17),IR(18),IR(19),IR(20),IR(21),IR(22),IR(23),IR(24),IR(25),IR(26),IR(27),IR(28),IR(29),IR(30),IR(31),IR(32),IR(33),IR(34),IR(35),IR(36),IR(37),IR(38),IR(39),IR(40),IR(41),IR(42),IR(43),IR(44),IR(45),IR(46),IR(47),IR(48),IR(49),IR(50),IR(51),IR(52),IR(53),IR(54),IR(55),IR(56),IR(57),IR(58),IR(59),IR(60),IR(61),IR(62),IR(63),IR(64),IR(65),IR(66),IR(67),IR(68),IR(69),IR(70),IR(71),IR(72),IR(73),IR(74),IR(75),IR(76),IR(77),IR(78),IR(79),IR(80),IR(81),IR(82),IR(83),IR(84),IR(85),IR(86),IR(87),IR(88),IR(89),IR(90),IR(91),IR(92),IR(93),IR(94),IR(95),IR(96),IR(97),IR(98),IR(99),IR(100))
      *VR(1),VR(2),VR(3)

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      *IR(4),VR(4)
      30 FORMAT(IX,I2,JAB,I5,I2,A1,F5.2,E15.7,F10.4,I5,F7.4)
      2 FORMAT(I2,JAB,I5,I1,A1,F3.2,E15.7,F10.4,I5,F5.2)
      7 IF (IR(1) .NE. 1) GO TO 3
      NOSUB = NOSUB + 1
      SUBNO(NOSUB) = IR(2)
      GO TO 1
      65 3 IF (IR(1) .NE. 4) GO TO 4
      NOMOD = NOMOD + 1
      MODNO(NOMOD) = IR(2)
      GO TO 1
      70 4 IF (IR(1) .NE. 3) GO TO 5
      L = IR(2)
      G(L) = VR(1)
      IF (VR(2) .EQ. 0.) GO TO 1
      NOLIST = NOLIST + 1
      LISTNC(NOLIST) = L
      VALUEN(L,LIST) = VR(1)
      GO TO 1
      75 5 IF (IR(1) .NE. 4) GO TO 6
      NOOUT = NOOUT + 1
      IF (NOOUT.GT.50) GO TO 1
      ONAME1(NOOUT) = ALPHA(2)
      ONAME2(NOOUT) = ALPHA(3)
      OUTNO(NOOUT) = IR(2)
      GO TO 1
      85 6 IF (IR(1) .NE. 5) GO TO 16
      IF (VR(1) .EQ. 0.) GO TO 17
      LOSTAT = LOSTAT + 1
      17 NOSTAT = NOSTAT + 1
      STATNO(NOSTAT) = IR(2)
      ONAME3(NOSTAT) = ALPHA(2)
      ONAME4(NOSTAT) = ALPHA(3)
      GO TO 1
      90 16 IF (IR(1) .NE. 7) GO TO 19
      NPLOT = NPLOT + 1
      IF (NPLOT.GT.15) GO TO 1
      DO 20 I=1,2
      20 VLABE (I,NPLOT) = ALPHA(I+1)
      OUTPL(NPLOT) = IR(2)
      GO TO 1
      95 19 IF (IR(1) .NE. 8) GO TO 18
      IF (IFER.E3.SSS) GO TO 194
      IF (VR(4) .GT. 0.) GO TO 192
      IF (IR(3) .NE. 0.4V) IR(3) .NE. 1 GO TO 193
      ISGCT = ISGCT + 1
      SIGMA(ISGCT) = VR(1)
      SIGLB(ISGCT) = VR(2)
      SIGUB(ISGCT) = VR(3)
      ISNDX(ISGCT) = IR(2)
      IDIST(ISGCT) = IR(3)
      GO TO 1
      100 18 IF (IR(1) .NE. 9) GO TO 191
      STEP = 11
      READ(5,0) NP, I3VMS4, IPLOT, XL1M8D, KSS16, (CEPS1(I), I=1,5), PSIZE
      0 FORMAT(I34,2F10.3,5I2,E15.7)
      GO TO 1

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115      192 IF(IRR(3).GT.5) GO TO 193
          ITC=ITCT+1
          TSMA(ITCT)=VR(1)
          TUB(ITCT)=VR(2)
          TUB(ITCT)=VR(3)
          ITNDX2(ITCT)=IR(2)
          IF(IRR(4).GT.0) ITNDX2(ITCT)=IR(4)
          ITNDX(ITCT)=IR(2)
          ITDST(ITCT)=IR(3)
          TSPER(ITCT)=VR(4)
          TSPG(ITCT)=TPSG4A
          TYPPE(ITCT)=0.
          IF(TPER.EQ.CPER) TYPPE(ITCT)=1.
          GO TO 1
194 RNSTR=VR(1)
          GO TO 1
195 WRITE(6,551A)
551A FORMAT(1X,50HUNDEFINED DISTRIBUTION TYPE NUMBER ENTERED - CARD REJ
      *CTED)
135      *VR(1),VR(2),VR(3),
      *IR(4),VR(4)
          GO TO 1
191 CONTINUE
          NCASE=NCASE+1
          IF(IRR(2).EQ.0) RETURN
          N = IR(2)
          DO 12 I=1,N
            READ (5,13) J,Y,MMND,MIER,SIGNO,BETA
            WRITE (6,13) J,Y,MMND,MIER,SIGNO,BETA
13      FORMAT (15,F5.0,2(3X,012),2(15.6))
            NORMNO(I) = NORMNO + 1
            C(I) = Y
          K(I+1) = MMND
          K(I+2) = MIER
          C(I+3) = SIGNO
          12 C(I+4) = BETA
          RETURN
50 STOP
155      END

```

CARD NR. SEVERITY DETAILS DIAGNOSIS OF PROBLEM

60 I 33 CD 60 FIELD WIDTH OF A CONVERSION DESCRIPTOR SHOULD BE AS LARGE AS THE MINIMUM SPECIFIED FOR THAT DESCRIPTOR.

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
1-0INPT1	1-140	153
VARIABLES		
445 ALPHA	SM TYPE	RELOCATION
434 BETA	REAL	ARRAY
0 C	REAL	ARRAY
30 CEP SIG	INTEGER	ARRAY
233 O PERTY	REAL	ARRAY
424 I	INTEGER	ARRAY
24 IBVNSM	INTEGER	ARRAY
7131 IDIST	INTEGER	ARRAY
25 IPLOT	INTEGER	ARRAY
435 IR	INTEGER	ARRAY
6667 ISGCT	INTEGER	ARRAY
7061 ISNOX	INTEGER	ARRAY
7210 ITCT	INTEGER	ARRAY
7262 ITDIST	INTEGER	ARRAY
7258 ITNOX	INTEGER	ARRAY
7344 ITNOX2	INTEGER	ARRAY
427 J	INTEGER	ARRAY
417 JAR	INTEGER	ARRAY
420 JC	INTEGER	ARRAY
0 K	INTEGER	ARRAY
27 KSSIG	REAL	ARRAY
423 L	INTEGER	ARRAY
5772 LISTNO	INTEGER	ARRAY
6411 LOSTAT	INTEGER	ARRAY
431 MAND	INTEGER	ARRAY
432 MIER	INTEGER	ARRAY
4471 MODNO	REAL	ARRAY
426 N	INTEGER	ARRAY
7360 NCASE	INTEGER	ARRAY
5771 NOLIST	INTEGER	ARRAY
4470 NOMOD	INTEGER	ARRAY
6136 NOOUT	INTEGER	ARRAY
3730 NOPLOT	INTEGER	ARRAY
6557 NORNOH	INTEGER	ARRAY
6412 NOSTAT	INTEGER	ARRAY
4634 NOSUB	INTEGER	ARRAY
425 NP	INTEGER	ARRAY
3677 NPLOT	INTEGER	ARRAY
REFS	REFS	REFS
134	134	134
144	144	144
20	20	20
22	22	22
22	22	22
71	71	71
25	25	25
127	127	127
296	296	296
20	20	20
15	15	15
29	29	29
77	77	77
107	107	107
134	134	134
15	15	15
103	103	103
36	36	36
116	116	116
124	124	124
117	117	117
125	125	125
37	37	37
37	37	37
37	37	37
147	147	147
143	143	143
56	56	56
32	32	32
41	41	41
74	74	74
28	28	28
86	86	86
149	149	149
150	150	150
31	31	31
141	141	141
139	139	139
73	73	73
66	66	66
78	78	78
146	146	146
87	87	87
62	62	62
93	93	93
70	70	70
142	142	142
26	26	26
4	4	4
4	4	4
4	4	4
87	87	87
112	112	112
13	13	13
93	93	93
31	31	31
144	144	144
22	22	22
22	22	22
148	148	148
39	39	39
47	47	47
112	112	112
95	95	95
112	112	112
108	108	108
63	63	63
84	84	84
110	110	110
141	141	141
104	104	104
106	106	106
107	107	107
118	118	118
126	126	126
123	123	123
116	116	116
124	124	124
117	117	117
125	125	125
37	37	37
37	37	37
37	37	37
147	147	147
143	143	143
56	56	56
32	32	32
41	41	41
74	74	74
28	28	28
86	86	86
149	149	149
150	150	150
31	31	31
141	141	141
139	139	139
73	73	73
66	66	66
78	78	78
146	146	146
87	87	87
62	62	62
93	93	93
70	70	70
142	142	142
26	26	26
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4	4	4
87	87	87
112	112	112
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93	93	93
31	31	31
144	144	144
22	22	22
22	22	22
148	148	148
39	39	39
47	47	47
112	112	112
95	95	95
112	112	112
108	108	108
63	63	63
84	84	84
110	110	110
141	141	141
104	104	104
106	106	106
107	107	107
118	118	118
126	126	126
123	123	123
116	116	116
124	124	124
117	117	117
125	125	125
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37	37	37
37	37	37
147	147	147
143	143	143
56	56	56
32	32	32
41	41	41
74	74	74
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86	86	86
149	149	149
150	150	150
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141	141	141
139	139	139
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146	146	146
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93	93	93
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142	142	142
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141	141	141
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37	37</	

VARIABLES	SN	TYPE	RELOCATION	REFS	DEF	LINE	REFS	DEF	LINE
6221 ONAME1	REAL	ARRAY	11	REFS	31	DEFINED	80		
6303 ONAME2	REAL	ARRAY	11	REFS	31	DEFINED	81		
6365 ONAME3	REAL	ARRAY	11	REFS	27	DEFINED	89		
6377 ONAME4	REAL	ARRAY	11	REFS	27	DEFINED	90		
6137 OUTNO	INTEGER	ARRAY	11	REFS	31	DEFINED	82		
3700 OUTPLI	INTEGER	ARRAY	11	REFS	35	DEFINED	97		
3727 PLOTNO	REAL	ARRAY	11	REFS	22	DEFINED	112		
22 PSIZE	REAL	ARRAY	11	REFS	30	DEFINED	44		
6568 RNDNO	INTEGER	ARRAY	11	REFS	15	DEFINED	129		
6666 MSTR1	REAL	ARRAY	11	REFS	15	DEFINED	105		
6741 SGL8	REAL	ARRAY	11	REFS	15	DEFINED	104		
6671 SIGMA	REAL	ARRAY	11	REFS	144	DEFINED	143		
433 SIGNO	REAL	ARRAY	11	REFS	15	DEFINED	106		
7411 SIGU8	REAL	ARRAY	11	REFS	100	DEFINED	48		
234 SSS	REAL	ARRAY	11	REFS	4	DEFINED	88		
6413 STATNO	INTEGER	ARRAY	11	REFS	12	DEFINED	111		
3731 STEP	REAL	ARRAY	11	REFS	4	DEFINED	63		
4635 SUBNO	REAL	ARRAY	11	REFS	17	DEFINED	118		
7224 TL8	REAL	ARRAY	11	REFS	17	DEFINED	110		
7332 INXT	REAL	ARRAY	11	REFS	56	DEFINED	52		
421 TPER	REAL	ARRAY	11	REFS	36	DEFINED	134	DEFINED	52
422 TPSGMA	REAL	ARRAY	11	REFS	17	DEFINED	125	DEFINED	52
7320 TPSIG	REAL	ARRAY	11	REFS	17	DEFINED	125		
7212 TSGMA	REAL	ARRAY	11	REFS	17	DEFINED	117		
7274 TSPER	REAL	ARRAY	11	REFS	17	DEFINED	124		
7236 TUB	REAL	ARRAY	11	REFS	17	DEFINED	119		
7306 TYPPER	REAL	ARRAY	11	REFS	17	DEFINED	126		
6054 VALUE	REAL	ARRAY	11	REFS	4	DEFINED	75		
4424 VLABLE	REAL	ARRAY	11	REFS	4	DEFINED	96		
441 VR	REAL	ARRAY	11	REFS	29	DEFINED	71		
				REFS	104	DEFINED	117		
				REFS	134	DEFINED	119		
				REFS	23	DEFINED	112		
26 KLAMBO	REAL	ARRAY	11	REFS	144	DEFINED	143		
430 Y	REAL	ARRAY	11	REFS	144	DEFINED	143		

FILE NAMES	MODE	READS	REFS	DEF	LINE	REFS	DEF	LINE
TAPES	FMT	52	112	143				
TAPE6	FMT	50	56	131				

EXTERNALS	TYPE	ARGS	REFERENCES
EOF	REAL	1	54

STATEMENT LABELS	DEF	LINE	REFERENCES	DEF	LINE	REFERENCES
5 1	52	64	103	72	76	79
306 2	60	52		130	137	
20 3	65	61				
25 4	63	63				
42 5	77	63				
54 6	84	77				
0 7	INACTIVE	61				
327 8	FMT	113	112			
0 12		152	142			
407 13	FMT	145	144			
70 16		92	84			
61 17		87	85			
131 18		110	93			

STATEMENT LABELS	DEF LINE	REFERENCES
105 19	99	32
0 20	95	95
300 30	FMT	59
240 31	FMT	55
230 50		51
0 55	INACTIVE	54
201 191		54
137 192		130
174 193		115
172 194		131
336 5510	FMT	123
		132
		131

LOOPS LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES
100 20	I	95 96	29	INSTACK
206 12	I	142 152	218	
COMMON BLOCKS LENGTH MEMBERS - BIAS NAME(LENGTH)				
/ /			0 C	(3430)

EQUIV CLASSES	LENGTH	MEMBERS - BIAS NAME(LENGTH)
C	3630	J K (3510)
		21 PLOT (1)
		24 GEPSIG (6)
		2007 P-OTND (1)
		2324 V-ABLE (30)
		2460 N5JJB (1)
		3365 LISTND (50)
		3167 OUTND (50)
		3317 ONAME3 (13)
		3338 MOSTAT (1)
		3443 RNDMNO (50)
		3313 SIGMA (40)
		3533 ISNXX (40)
		3722 FSGMA (10)
		3752 LINDX (10)
		3762 TYPER (10)
		3912 LINDX2 (10)
STATISTICS		
PROGRAM-LENGTH	4533	296
CM BLANK COMMON LENGTH	73683	3630

```

SUBROUTINE_OUP2
C      OUTPUT-INITIALIZATION SUBROUTINE_OUP2
COMMON C(3830),GRAPH
EQUIVALENCE (C(2017),ITCNT), (C(3167),NOOUT), (C(2016),PGCNT),
5      C(2014),ITCNT), (C(2003),PCNT), (C(2015),CP),
C(2018),TAPE), (C(2013),TAPENO), (C(2013),OOC),
C      C(2000),T), (C(2021),KCONV), (C(2025),TIME),
C(2009),PLOTNO), (C(2009),NOPLT), (C(3168),OUTNO),
C      C(2004),PPNT), (C(2023),OPOINT)
10      DIMENSION GRAPH(1,1),TIME(30),OUTNO(50)
INTEGER PCNT,ITCNT,OUTNO,OPOINT
EQUIVALENCE (C(1985),OUTPLT)
INTEGER OUTPLT
DIMENSION OUTPLT(15)
15      KCONV=0
ITCNT = 300 + 1.0
PCNT = 7-0.000001
PGCNT = 1
DTCNT = INDOUT + 4/3
IF (ITCNT .GE. 71.55 TO 2
ITCNT = ITCNT + 1
CALL LCMPO
C
2      TIME(1)=T
OPOINT = 1
DO 10 J=1,NOPLT
K=OUT-11(J)
15      GRAPH(1,J)=C(K)
RETURN
END
30
EXEC 165
EXEC 167
EXEC 168
EXEC 169
EXEC 170
EXEC 171
EXEC 172
EXEC 173
EXEC 174
EXEC 175
EXEC 176
EXEC 177
EXEC 178
EXEC 179
EXEC 180
EXEC 181
EXEC 182
EXEC 183
EXEC 184
EXEC 185
EXEC 186
EXEC 187
EXEC 188
EXEC 189
EXEC 190
EXEC 191
EXEC 192
EXEC 193
EXEC 194
EXEC 195

```

CARD NR. SEVERITY DETAILS DIAGNOSIS-OF PROBLEM

20 I NOPLT THIS STATEMENT MAY REDEFINE A CURRENT LOOP CONTROL VARIABLE OR PARAMETER.

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
1- OUP12	1	29

VARIABLES	SM	TYPE	RELOCATION	REFS
0 C	REAL	ARRAY	17*4	12 28
3736 CPP	REAL	REFS		
3734 DOC	REAL	REFS	16	
3740 DTENT	INTEGER	REFS	11	19
7366 GRAPH	REAL	REFS	10	28
3735 ITENT	INTEGER	REFS	20	21
33 J	INTEGER	REFS	28	26
34 K	INTEGER	REFS	27	
3744 KCONV	INTEGER	REFS	15	
6136 MOOUT	INTEGER	REFS	19	
3730 NOPLT	INTEGER	REFS	26	
3748 OPOINT	INTEGER	REFS	11	25
6137 OUTNO	INTEGER	REFS	10	11
3700 OUTPLT	INTEGER	REFS	13	27
3722 PCNT	REAL	REFS	17	
3737 PGENT	INTEGER	REFS	11	10
3727 PLOTNO	REAL	REFS		
3723 PPNT	REAL	REFS		
3717 T	REAL	REFS	17	24
3741 TAPE	REAL	REFS		
3742 TAPEND	REAL	REFS		
3750 TIME	REAL	REFS	10	24

EXTERNALS	TYPE	ARGS	REFERENCES
OUNPO	C		22

STATEMENT LABELS	DEF LINE	REFERENCES
20 2	24	23
0 10	28	25

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES
26 10	J		26.28	38	INSTACK

COMMON BLOCKS	LENGTH	MEMBERS	BIAS NAME(LENGTH)
/ /	3831	J C	(3830)

EQUIV CLASSES	LENGTH	MEMBERS	BIAS NAME(LENGTH)
C	3831	1994 OUTPLT (15)	1939 T (1)
		2003 PPNT (1)	2007 PLOTNO (1)
		2012 DDC (1)	2013 ITENT (1)
		2015 PGENT (1)	2016 CPP (1)
		2018 TAPEND (1)	2017 TAPE (1)
		2024 TIME (300)	2022 OPOINT (1)
			3167 OUTNO (58)

STATISTICS	PROGRAM LENGTH	CM BLANK COMMON LENGTH
	353	73673
	29	3831

```

SUBROUTINE OUTP13
COMMON C(3830),GRAPH
EQUIVALENCE (C(1158),OUTNO 1, (C(1218),ONAME1), (C(1268),ONAME2),
C(2017),OTCNT 1, (C(1167),VOUT 1), (C(12016),PGCNT 1),
C(2014),ITCNT 1, (C(2003),PCNT 1), (C(2015),PPP 1),
C(2000),T 1, (C(1266),DER 1), (C(12018),TAPE 1),
C(12019),TAPEND 1, (C(12008),PLOTHD 1), (C(12009),NOPLOT 1),
C(12051),PPP 1, (C(2004),PPNT 1), (C(12025),TIME 1),
C(12023),OPOINT 1)
EQUIVALENCE (C(1305),OUTPLT)
DIMENSION B(52),OUTNO(50),ONAME1(50),ONAME2(50)
DIMENSION TIME(300),GRAPH(1,1)
INTEGER OUTPL(115)
INTEGER DIOCT,PGCNT,OUTNO
INTEGER OPOINT
INTEGER OUTPLT
C
C** SAVE SPOT JITTER MAX/MIN VALUES
IF(C(1680).GT.C(1567)) C(1557) = C(1560)
IF(C(1640).LT.C(1568)) C(1558) = C(1580)
IF(C(1681).GT.C(1577)) C(1577) = C(1581)
IF(C(1681).LT.C(1578)) C(1578) = C(1581)
C
25 IF (ITCNT .GT. 6) GO TO 7
ITCNT = ITCNT + 1
CALL LUMPO
PGCNT = 1
C
30 7. IF (DER. EQ. JER1) GO TO 8
DER1 = DER
WRITE(6,20)T,DER
20 FORMAT(1H,5TIME=1,7,2X,10MSTEP SIZE=1PE19.7)
8. IF (T .LT. PCNT) GO TO 5
9 PCNT = PCNT + CP
IF (PGCNT .NE. 1) GO TO 3
IF (VOUT .LE. 1) GO TO 3
1. WRITE(6,2) (ONAME1(I),ONAME2(I),I=1,NOUT)
2. FORMAT (14I,3X,4TIME=5X,5(7X,2A6,7X,2A6,7X,2A6,7X,
12A6,7X,2A6)1)
PGCNT = 2*OTCNT + 4
3. IF (PGCNT .GE. 86) GO TO 1
DO 4 I = 1,NOUT
J = OUTNO(I)
4. 8(I) = C(J)
IF (NOUT .LE. 1) GO TO 15
WRITE (6,5) T,8(I), I = 5,VOUT
5. FORMAT (7//,F14.7,1P5E19.7/(14X,1P5E19.7)1)
PGCNT = PCNT + OTCNT + 4
15. IF (T.LT.PPNT .OR. NOPLOT .EQ. 0) RETURN
PPNT = PPNT + PPP
KPOINT = OPOINT + 1
IF (KPOINT = 300) 16,13,18
13. WRITE (6,14)
14. FORMAT (7//1H **** ARNING-PLOTTING ARRAY FILLED-ONLY FIRST 300 P
COINIS PLOTTED ****,//1
16. OPOINT = KPOINT
EXEC 196
EXEC 197
EXEC 198
EXEC 199
EXEC 200
EXEC 201
EXEC 202
EXEC 203
EXEC 204
EXEC 205
EXEC 206
EXEC 207
EXEC 208
EXEC 209
EXEC 210
EXEC 211
EXEC 212
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EXEC 240
EXEC 241
EXEC 242
EXEC 243
EXEC 244
EXEC 245
EXEC 246
EXEC 247
EXEC 248
EXEC 249
EXEC 250
EXEC 251
EXEC 252

```

SUBROUTINE OUP13 7474 OPT=1 FIN 4.2-75067 05/05/75 16.24.06. PAGE 2

TIME (POINT)=Y
 DO 10 J=1,NPLOT EXEC 253
 K=OUTPLT(J) EXEC 254
 10 GRAPHPOINT = J=C(K) EXEC 255
 10 RETURN EXEC 256
 END EXEC 257
 EXEC 258

SUBROUTINE OUP13 7474 OPT=1 FIN 4.2-75067 05/05/75 16.24.06. PAGE 3

CARD NR SEVERITY DETAILS DIAGNOSIS OF PROBLEM
 61 I NOPL0T THIS STATEMENT MAY REDEFINE A CURRENT LOOP CONTROL VARIABLE OR PARAMETER.

SUBROUTINE OUTF3 7474 OPT=1
 FTN 4.2+73067 05/05/75 16.24.06. PAGE 5

STATEMENT LABELS	DEF LINE	REFERENCES
77 15	50	34 46
112 16	57	53
123 18	62	53
131 20	33	32

FMT 33 32

LOOPS LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES	EXT REFS
41	I	38	108		
61 4	I	43 45	38	INSTACK	
120 10	J	59 61	38	INSTACK	

COMMON BLOCKS LENGTH 3831 MEMBERS = BIAS NAME(LENGTH)
 / / 0 C (3830) 3830 53AP4 (1)

EQUIV CLASSES	LENGTH	MEMBERS	BIAS NAME(LENGTH)
C	3831	1384 OUTPLT (15)	
		2303 PPNT (1)	1999 T (1)
		2308 NOPLOT (1)	2004 PPP (1)
		2315 PFCNT (1)	2013 ITCNT (1)
		2318 TAPENJ (1)	2016 DFCNT (1)
		2663 CER (1)	2017 TAPE (1)
		3217 UNAME1 (50)	2022 DPJINT (1)
			2024 TIME (300)
			3165 NCJUT (1)
			3267 ONAME2 (50)
			2002 PCNT (1)
			2007 PLOTNO (1)
			2014 CPP (1)
			3167 OUTNO (50)

STATISTICS
 PROGRAM LENGTH 2713 105
 CH BLANK COMMON LENGTH 73673 3831

```

SUBROUTINE ZERO
COMMON C(3830)
EQUIVALENCE (C(1384), NPLOT)
EQUIVALENCE (C(2323), OPOINT)
EQUIVALENCE (C(2361), NOMOD)
EQUIVALENCE (C(2461), NOSUB)
EQUIVALENCE (C(3066), NOLIST)
EQUIVALENCE (C(3167), NOOUT)
EQUIVALENCE (C(3330), LOSTAT)
EQUIVALENCE (C(3333), NOSTAT)
EQUIVALENCE (C(3440), NORNDM)
INTEGER OPOINT
LOSTAT = 0
NOSTAT = 0
NOSUB = 0
NOMOD = 0
NOOUT = 0
NORNDM = 0
NOLIST = 0
OPOINT = 0
NPLJTC =
RETURN
END
EXEC 259
EXEC 260
EXEC 261
EXEC 262
EXEC 263
EXEC 264
EXEC 265
EXEC 266
EXEC 267
EXEC 268
EXEC 269
EXEC 270
EXEC 271
EXEC 272
EXEC 273
EXEC 274
EXEC 275
EXEC 276
EXEC 277
EXEC 278
EXEC 279
EXEC 280
EXEC 281

```

SYMBOLIC REFERENCE MAP (3=3)

ENTRY POINTS DEF LINE REFERENCES
1 ZERO 1 22

VARIABLES SN TYPE REAL ARRAY RELOCATION REFS

0	C	REAL	ARRAY	RELOCATION	REFS	2	3	4	5	6	7	8
6411	LOSTAT	INTEGER	/	/	REFS	10	11	13				
5771	NOLIST	INTEGER	/	/	REFS	9	DEFINED	19				
6470	NOMOD	INTEGER	/	/	REFS	7	DEFINED	16				
5136	NOOUT	INTEGER	/	/	REFS	5	DEFINED	17				
6557	NORNDM	INTEGER	/	/	REFS	8	DEFINED	10				
6412	NOSTAT	INTEGER	/	/	REFS	11	DEFINED	14				
4634	NOSUB	INTEGER	/	/	REFS	10	DEFINED	15				
3677	NPLOT	INTEGER	/	/	REFS	6	DEFINED	21				
3746	OPOINT	INTEGER	/	/	REFS	3	DEFINED	12	20			

COMMON BLOCKS LENGTH MEMBERS - BIAS NAME(LENGTH)
/ / 3830 0-C (3830)

EQUIV-CLASSES LENGTH MEMBERS - BIAS NAME(LENGTH)
C 3830
2383 NPLOT (1)
2460 NOSUB (1)
3337 LOSTAT (1)

STATISTICS

PROGRAM LENGTH 103
CM BLANK COMMON LENGTH 73661 3830

2022 OPOINT (1)
3055 NOLIST (1)
3338 NOSTAT (1)
2360 NOMOD (1)
3166 NOOUT (1)
3439 NORNDM (1)


```

SUBROUTINE SUBJL
COMMON C133301
EQUIVALENCE (C12461), NOSUB 1, (C12462), SUBNO 1
DIMENSION SUBNO(99)
DO 1 I = 1, NOSUB
J = SUBNO(I)
GO TO (1, 2, 3, 4, 5, 6, 7, 8, 9), J
2 CALL IMPL
GO TO 1
3 CALL DUPT1
GO TO 1
4 CALL STGE1
GO TO 1
5 CALL CNTRL
GO TO 1
6 CALL RMU1
GO TO 1
7 CALL AUX1
GO TO 1
8 CALL AUXB1
GO TO 1
9 CALL AUXC1
1 CONTINUE
RETURN
END
EXEC 282
EXEC 283
EXEC 284
EXEC 285
EXEC 286
EXEC 287
EXEC 288
EXEC 289
EXEC 290
EXEC 291
EXEC 292
EXEC 293
EXEC 294
EXEC 295
EXEC 296
EXEC 297
EXEC 298
EXEC 299
EXEC 300
EXEC 301
EXEC 302
EXEC 303
EXEC 304
EXEC 305
EXEC 306

```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
1 SUBL1	1	24

VARIABLES	SM	TYPE	RELOCATION	REFS	2	2*3
0 C	REAL	ARRAY	/ /	REFS	6	DEFINED
44 I	INTEGER			REFS	7	DEFINED
45 J	INTEGER			REFS	3	5
4634 MOSUB	INTEGER	/ /		REFS	3	4
4635 SUBNO	REAL	ARRAY	/ /	REFS	3	6

EXTERNALS	TYPE	ARGS	REFERENCES
AUX1	C		10
AUX2	C		27
AUX3	C		22
CNTR1	C		14
INPT1	C		3
OUTP1	C		13
RNDM1	C		15
STGE1	C		12

STATEMENT LABELS	DEF LINE	REFERENCES
41 1	23	7
22 2	8	7
24 3	13	7
26 4	12	7
30 5	14	7
32 6	15	7
34 7	18	7
36 8	20	7
40 9	22	7

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES	EXT REFS
3	1	I	5	23	413	

COMMON BLOCKS	LENGTH	MEMBERS	BIAS NAME(LENGTH)
/ /	3830	J C	13830

EQUIV CLASSES	LENGTH	MEMBERS	BIAS NAME(LENGTH)
C	3830	2460 MOSUB	11

STATISTICS	PROGRAM	LENGTH	CM BLANK	COMMON LENGTH
		463	73663	3830

	SUBROUTINE	SUB12	EXEC	307
	COMMON C(3830)		EXEC	308
	EQUIVALENCE (C(2461),NOSUB 1, (C(2462),SUBNO 1)		EXEC	309
5	DIMENSION SUBNO(9)		EXEC	310
	DO 1 I = 1, NOSUB		EXEC	311
	J = SUBNO(I)		EXEC	312
	GO TO 1 1, 2, 3, 4, 5, 6, 7, 8, 9, J		EXEC	313
	2 CALL IMP12		EXEC	314
10	GO TO 1		EXEC	315
	3 CALL OPT12		EXEC	316
	GO TO 1		EXEC	317
	4 CALL SIGE2		EXEC	318
	GO TO 1		EXEC	319
15	5 CALL CATR2		EXEC	320
	GO TO 1		EXEC	321
	6 CALL RADH2		EXEC	322
	GO TO 1		EXEC	323
	7 CALL AUKA2		EXEC	324
20	GO TO 1		EXEC	325
	8 CALL AUXB2		EXEC	326
	GO TO 1		EXEC	327
	9 CALL AUXC2		EXEC	328
25	1 CONTINUE		EXEC	329
	RETURN		EXEC	330
	END		EXEC	331
			EXEC	332

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS LINE REFERENCES
1 SUBL2 1 25

VARIABLES SH TYPE RELOCATION REFS 2*4
0 C REAL / / 3 7 6
44 I / / / 7 7
45 J / / / 8 6
46 K / / / 4 5
47 L / / / 4 7

EXTERNALS TYPE ARGS REFERENCES
AUX12 0 13
AUXB2 0 21
AUXC2 0 23
CNTR2 0 15
INPT2 0 9
OUP12 0 11
RNDH2 0 17
STGE2 0 13

STATEMENT LABELS DEF LINE REFERENCES 8 10 12 14 16 18 20 22
41 1 24 5
22 2 9 3
24 3 11 3
26 4 13 3
30 5 15 3
32 6 17 3
34 7 19 3
36 8 21 3
40 9 23 3

LOOPS LABEL INDEX FROM-TO LENGTH PROPERTIES EXT REFS
3 1 6 24 418

COMMON BLOCKS LENGTH MEMBERS - BIAS NAME(LENGTH)
/ 3830 0 C (3830)

EQUIV-CLASSES LENGTH MEMBERS - BIAS NAME(LENGTH)
C 3830 2163 MOSUB (1) 2461 SUBNO (99)

STATISTICS
PROGRAM-LENGTH 458 38
CM BLANK COMMON LENGTH 73668 3930

SUBROUTINE SUB13	7/17/74	DP1=1	FTN 6.2+75057	05/35/75 - 1b-24.11.	PAGE 4
SUBROUTINE SUB13					
COMMON C(3830)					
EQUIVALENCE ((2,61),NDSJ3 1, (C(2462),SUBNO3)					
DIMENSION SUBNO(99)					
5	DO 1 I = 1, NOSUB			EXEC	333
	J = SUBNO(I)			EXEC	334
	GO TO 1 1, 2, 3, 4, 5, 6, 7, 8, 9, J			EXEC	335
	2 CALL INPT3			EXEC	336
	GO TO 1			EXEC	337
-10	3 CALL OUP13			EXEC	338
	GO TO 1			EXEC	339
	4 CALL STGE3			EXEC	340
	GO TO 1			EXEC	341
	5 CALL CNTR3			EXEC	342
15	GO TO 1			EXEC	343
	6 CALL RNDH3			EXEC	344
	GO TO 1			EXEC	345
	7 CALL AUXH3			EXEC	346
	GO TO 1			EXEC	347
20	8 CALL AUXB3			EXEC	348
	GO TO 1			EXEC	349
	9 CALL AUXG3			EXEC	350
	1 CONTINUE			EXEC	351
	RETURN			EXEC	352
25	END			EXEC	353
				EXEC	354
				EXEC	355
				EXEC	356
				EXEC	357

SYMBOLIC REFERENCE MAP (2=3)

ENTRY POINTS	DEF LINE	REFERENCES
1-SUBL3	1	26
VARIABLES	SM TYPE	RELOCATION
0 C	REAL	ARRAY / /
44 I	INTEGER	REFS 2 2*3
45 J	INTEGER	REFS 6 DEFINED 5
4634 MOSUB	INTEGER	REFS 7 DEFINED 6
4635 SUBNO	REAL	ARRAY / /
		REFS 3 5
		REFS 3 4 6
EXTERNALS	TYPE	ARGS REFERENCES
AUX3	0	19
AUX83	0	20
AUXC3	0	22
CNTR3	0	14
INPT3	0	9
OUPT3	0	10
RNDM3	0	15
STGE3	0	12

STATEMENT LABELS	DEF LINE	REFERENCES
41 1	23	7
22 2	6	7
24 3	10	7
26 4	12	7
30 5	14	7
32 6	15	7
34 7	19	7
36 8	20	7
40 9	22	7

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES	EXT REFS
3	1	I	5	23	418	

COMMON BLOCKS	LENGTH	MEMBERS	BIAS NAME(LENGTH)
/ /	3830		J-C (3,30)

EQUIV-CLASSES	LENGTH	MEMBERS	BIAS NAME(LENGTH)
C	3830	2+60 MOSUB (1)	2461 SUBNO (99)

STATISTICS	PROGRAM LENGTH	CH BLANK COMMON LENGTH
	653	38
	73660	3830

SUBROUTINE STGE2 74/74 OPT=1
 05/05/75 16.24.12. PAGE 1
 FIN 4.2+75067
 SUBROUTINE STGE2
 COMMON C(3830)
 EQUIVALENCE (C(2011),KSTEP), (C(2020),LCONV), (C(2021),KCONV)
 KCONV = 0
 LCONV = 0
 KSTEP = 1
 RETURN
 END
 EXEC 358
 EXEC 359
 EXEC 360
 EXEC 361
 EXEC 362
 EXEC 363
 EXEC 364
 EXEC 365

SUBROUTINE STGE2 74/74 OPT=1
 05/05/75 16.24.12. PAGE 2
 FIN 4.2+75067
 SYMBOLIC REFERENCE MAP (R=3)
 ENTRY POINTS DEF LINE REFERENCES
 1 STGE2 1 7
 VARIABLES SN TYPE RELOCATION
 0 C REAL ARRAY / / REFS
 3744 KCONV INTEGER / / REFS
 3732 KSTEP INTEGER / / REFS
 3743 LCONV INTEGER / / REFS
 COMMON BLOCKS LENGTH MEMBERS - BIAS NAME(LENGTH)
 / / 0 C (3830)
 EQUIV CLASSES LENGTH MEMBERS - BIAS NAME(LENGTH)
 C C 3830 2010-KSTEP (1)
 STATISTICS
 PROGRAM LENGTH 58
 CH BLANK COMMON LENGTH 73663 3030

2019 LCONV (1) 2020 KCONV (1)

5

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES	1	17	21	32
1 STGE3						
VARIABLES	SN	TYPE	RELLOCATION			
0 C	REAL	ARRAY	REFS			
5147 DER	REAL	ARRAY	REFS			
5314 EL	REAL	ARRAY	REFS			
5460 EU	REAL	ARRAY	REFS			
5146 HMAX	REAL	ARRAY	REFS			
5145 HMIN	REAL	ARRAY	REFS			
3664 KASE	INTEGER	ARRAY	REFS			
3744 KCONV	INTEGER	ARRAY	REFS			
3732 KSTEP	INTEGER	ARRAY	REFS			
3743 LCONV	INTEGER	ARRAY	REFS			
5000 N	INTEGER	ARRAY	REFS			
3665 NJ	INTEGER	ARRAY	REFS			
3666 NPT	INTEGER	ARRAY	REFS			
3722 PCNT	REAL	ARRAY	REFS			
52 PRDER	REAL	ARRAY	REFS			
3731 STEP	REAL	ARRAY	REFS			
3717 T	REAL	ARRAY	REFS			
3720 TF	REAL	ARRAY	REFS			
5624 VAR	REAL	ARRAY	REFS			

EXTERNALS

NAME	TYPE	ARGS	REFERENCES
AMRK	1		29
AUXSUB	0		13
G4	0		11
OUPT3	0		31

INLINE FUNCTIONS

NAME	TYPE	ARGS	DEF LINE	REFERENCES
ABS	REAL	1	INTRIN	12

STATEMENT LABELS

DEF LINE	REFERENCES
20 10	15
26 20	14
41 40	20

COMMON BLOCKS

NAME	LENGTH	MEMBERS	BIAS NAME(LENGTH)
3030	3030	0	0

EQUIV CLASSES

NAME	LENGTH	MEMBERS	BIAS NAME(LENGTH)
1372 KASE	(1)		
1999 T	(1)		
2009 STEP	(1)		
2320 KCONV	(1)		
2662 AMX	(1)		
2864 EU	(1)		

STATISTICS

PROGRAM LENGTH	533	43
CM BLANK COMMON LENGTH	73663	3030

SUBROUTINE RESET 74/74 OPT=1 05/05/75 16.26.14. PAGE 1

```

SUBROUTINE RESET
COMMON C(3830)
EQUIVALENCE (C(3066),NOLIST), (C(3067),LISTND), (C(3117),VALUE)
DIMENSION LISTND(5), VALUE(50)
5 IF (NOLIST.EQ.0) RETURN
DO 1 I=1, NOLIST
J = LISTND(I)
1 C(J) = VALUE(I)
RETURN
END
EXEC 399
EXEC 400
EXEC 401
EXEC 402
EXEC 403
EXEC 404
EXEC 405
EXEC 407
EXEC 408

```

SUBROUTINE RESET 74/ OPT=1 05/05/75 16.26.14. PAGE 2

CARD NO. SEVERITY DETAILS DIAGNOSIS OF PROBLEM

6 I NOLIST THIS STATEMENT MAY REDEFINE A CURRENT LOOP CONTROL VARIABLE OR PARAMETER.

SUBROUTINE RESET 74/74 OPT=1 05/05/75 16.26.14. PAGE 3

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES	SN	TYPE	RELOCATION	REFS	303	DEFINED
1 RESET	1	5	3					
0 C	REAL	ARRAY	/	/	REFS	2	303	DEFINED 8
11 I	INTEGER				REFS	7	8	DEFINED 6
12 J	INTEGER				REFS	6	DEFINED	7
5772 LISTND	INTEGER	ARRAY	/	/	REFS	3		7
5771 NOLIST	INTEGER	ARRAY	/	/	REFS	3		6
6054 VALUE	REAL	ARRAY	/	/	REFS	3	4	8

STATEMENT LABELS DEF. LINE REFERENCES

0 1 8 5

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES
6	1	1	6-8	38	INSTACK

COMMON BLOCKS	LENGTH	MEMBERS	BIAS NAME(LENGTH)
/	3830	0 C	(3830)

EQUIV CLASSES	LENGTH	MEMBERS	BIAS NAME(LENGTH)
C	3830	3065 NOLIST (1)	3066 LISTND (50)

STATISTICS

PROGRAM LENGTH 133 11

CM BLANK COMMON LENGTH 73663 3830

```

SUBROUTINE TABLE (X,XI,YI,NK,XK,XLABEL,YI)
DIMENSION XLABEL(12)
NK = 6.
YI = 7IN7P1-(X,XI,YI,NK,XK,XLABEL)
RETURN
END
5

```

EXEC	409
EXEC	410
EXEC	411
EXEC	412
EXEC	413
EXEC	414

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
3 TABLE	1	5

VARIABLES	SN	TYPE	RELLOCATION
0 NX	INTEGER	F.P.	
0 X	REAL	F.P.	
0 XI	REAL	F.P.	
0 XK	REAL	F.P.	
0 XLABEL	REAL	F.P.	
0 Y	REAL	F.P.	ARRAY
0 YI	REAL	F.P.	

```

DEFINED 1
DEFINED 1
DEFINED 1
DEFINED 1
DEFINED 4
DEFINED 4
DEFINED 1

```

STATISTICS _____
PROGRAM LENGTH _____

SUBROUTINE TABL2 7/74 OPT=1 FTN 4.2+75067 05/05/75 16.26.16. PAGE 1

SUBROUTINE TABL2(X,Y,XVI,ZI,NXY,XINTER,XLABEL,Z)
 DIMENSION XLABEL(2)
 DIMENSION XVI(2),NXY(2)
 Z = FINTP2 (X,Y,XVI,XVI(NXY+1),ZI,NXY,NXY(2),NXY,XINTER,XLABEL)
 RETURN
 END
 EXEC 415
 EXEC 416
 EXEC 417
 EXEC 418
 EXEC 419
 EXEC 420

SUBROUTINE TABL2 7/74 OPT=1 FTN 4.2+75067 05/05/75 16.26.16. PAGE 2

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS DEF LINE REFERENCES
 3 TABL2 1 5

VARIABLES	SN	TYPE	RELOCATION	REFS	4*4	DEFINED
0 NXY		INTEGER	ARRAY	REFS	3	DEFINED 1
0 X		REAL	F.P.	REFS	4	DEFINED 1
0 XINTER		REAL	F.P.	REFS	4	DEFINED 1
0 XLABEL		REAL	ARRAY	REFS	2	DEFINED 1
0 XVI		REAL	ARRAY	REFS	3	DEFINED 1
0 Y		REAL	F.P.	REFS	2	DEFINED 1
0 Z		REAL	F.P.	REFS	4	DEFINED 1
0 ZI		REAL	F.P.	REFS	4	DEFINED 1

EXTERNALS TYPE ARGS REFERENCES
 FINTP2 REAL 10

STATISTICS
 PROGRAM LENGTH 608 32

```

SUBROUTINE TABL3(K,Y,Z,XYZI,WI,NXYZ,XINTER,XLABEL,M)
  DIMENSION XLABEL(2)
  DIMENSION XYZI(1),NXYZ(1)
  NZI=NXYZ(1)+N'YZ(2)+1
  XINTER=0.
  M=FINIP3-(X,Y,Z,XYZI,X/ZI(NXYZ+1),XYZI(NZI),WI,NXYZ(3),
  C NXYZ(2),NXYZ,XINTER,XLABEL)
  RETURN
END
EXEC 421
EXEC 422
EXEC 423
EXEC 424
EXEC 425
EXEC 426
EXEC 427
EXEC 428
EXEC 429

```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS DEF LINE REFERENCES
3 TABL3 1 8

VARIABLES	SN	TYPE	RELOCATION	REFS	2*4	3*6	DEFINED	1
0 NXYZ	47	INTEGER	ARRAY	REFS	DEFINED	4	DEFINED	1
0 NZI		INTEGER		REFS	6			
0 M		REAL	F.P.	DEFINED	1			
0 WI		REAL	F.P.	REFS	DEFINED	1	DEFINED	1
0 X		REAL	F.P.	REFS	DEFINED	1	DEFINED	1
0 XINTER		REAL	F.P.	REFS	DEFINED	1	DEFINED	5
0 XLABEL		REAL	ARRAY	REFS	5	DEFINED	1	1
0 XYZI		REAL	ARRAY	REFS	3*6	DEFINED	1	1
0 Y		REAL	F.P.	REFS	DEFINED	1	DEFINED	1
0 Z		REAL	F.P.	REFS	DEFINED	1	DEFINED	1

EXTERNALS TYPE ARGS REFERENCES

FINIP3 REAL 12 5

STATISTICS

PROGRAM LENGTH 503 40

```

      FUNCTION FINTP1(X,XL,YI,N,F,XL)
      DIMENSION XI(N), YI(N) , XL(2)
      IF( -G1. 0.) GO TO 30
      DO 10 I=2, 4
      IF(X .LE. XI(I)) GO TO 20
      I = N
      10 CONTINUE
      20 PCT = 1.-X*(I-1)/(XI(I)-XI(I-1))
      F = 1.
      30 FINP1 = YI(I-1) + PCT*(YI(I)-YI(I-1))
      RETURN
      END

```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES	RELOCATION			
4 FINTP1	1	11				
VARIABLES	SN	TYPE	RELOCATION			
0 F	REAL	F.P.	REFS	3	DEFINED	1
40 FINTP1	REAL		DEFINED	10		9
41 I	INTEGER		REFS	5	3*8	3*10
0 N	INTEGER	F.P.	REFS	2*2	4	DEFINED
42 PCT	REAL		REFS	10	DEFINED	8
0 X	REAL	F.P.	REFS	5	8	DEFINED
0 XI	REAL	ARRAY	REFS	2	5	3*8
0 XL	REAL	ARRAY	REFS	2	DEFINED	1
0 YI	REAL	ARRAY	REFS	2	3*10	DEFINED
1						1
STATEMENT LABELS						
0 10	DEF LINE	REFERENCES				
22 20						
31 30						
-OPS - LABEL * I INDEX FROM-TO LENGTH PROPERTIES						
15 10	4	6	38	INSTACK	EXITS	
STATISTICS						
PROGRAM LENGTH						35

```

      FUNCTION FINTP2(I,X,Y,ZI,VI,NI,XO,NY,NX,F,XL)
      DIMENSION XI(1),VI(1),ZI(NXO,1),T(2),XL(2)
      IF( .GT. 0.) GO TO 30
      DO 10 I=2,NY
      IF( .LE. VI(I)) GO TO 20
      10 CONTINUE
      I = NY
      20 PCI = (Y-VI(I-1))/(VI(I)-VI(I-1))
      30 DO 40 J=1,2
      L = I + J - 2
      40 T(J) = FINTP1(X,I,ZI(I,L),NX,F,XL)
      FINTP2 = T(1) + PCI*(T(2)-T(1))
      RETURN
      END

```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
4 FINIP2	1	13

VARIABLES	SN	TYPE	RELOCATION F.P.
0 F		REAL	
71 FINIP2		REAL	
72 I		INTEGER	
74 J		INTEGER	
75 L		INTEGER	
0 NX		INTEGER	F.P.
0 NXD		INTEGER	F.P.
0 NY		INTEGER	F.P.
73 PCT		REAL	
76 T		REAL	ARRAY
0 X		REAL	F.P.
0 XI		REAL	F.P.
0 XL		REAL	F.P.
0 Y		REAL	F.P.
0 YI		REAL	ARRAY
0 YI		REAL	F.P.
0 ZI		REAL	ARRAY
0 ZI		REAL	F.P.

EXTERNALS	TYPE	ARGS	REFERENCES
FINTP1	REAL	6	11

STATEMENT LABELS	DEF	LINE	REFERENCES
0 10	6	4	
26 20	8	3	
33 30	3	3	
0 40	11	3	

LOOPS	LABEL	INDEX	FRG-TO	LENGTH	PROPERTIES
21	10	* I	4 6	38	INSTACK
34	40	* J	9 11	203	EXTS EXT REFS

STATISTICS	
PROGRAM LENGTH	1003 54

```

FUNCTION FINTP3(X,Y,Z,XI,YI,ZI,WI,NZ,NV,NX,F,XL)
  DIMENSION XL(1),YI(1),ZI(1),WI(NX,NV,1),YI(2),XL(2)
  DO 10 I=2,NZ
    IF(ZI(I).EQ.0) GO TO 20
    I = NZ
    10 CONTINUE
    I = NZ
    20 PCT = (Z-ZI(1-1))/(ZI(1)-ZI(I-1))
    30 DO 40 J=1,2
      L = I + J - 2
      40 T(J) = FINTP2(X,Y,XI,YI,WI(L+1,L),NX,NV,NX,F,XL)
    FINTP3 = T(1) + PCT*(T(2)-T(1))
    RETURN
  END
  
```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES	VARIABLES	SN	TYPE	RELOCATION	DEF LINE	REFERENCES
4 FINTP3	1	12	0 F	REAL				
			101 FINTP3	REAL				
			102 I	INTEGER				
			104 J	INTEGER				
			105 L	INTEGER				
			0 NX	INTEGER				
			0 NY	INTEGER				
			0 NZ	INTEGER				
			103 PCT	REAL				
			106 T	REAL				
			0 WI	REAL				
			0 X	REAL				
			0 XI	REAL				
			0 XL	REAL				
			0 Y	REAL				
			0 YI	REAL				
			0 Z	REAL				
			0 ZI	REAL				

EXTERNALS	TYPE	ARGS	REFERENCES
FINTP2	REAL	10	10

STATEMENT LABELS	DEF LINE	REFERENCES
0 10	3	3
25 20	7	4
0 30	8	10
0 40	10	3

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES
20	10	I	3 5	38	INSTACK
33	40	J	6 10	258	EXITS

STATISTICS	PROGRAM LENGTH	1103	72
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```

SUBROUTINE PLOT% (GRAPH, NP, L, I, NPLOT%, NPLOT2, NPLOT)
C=NPLOT SUBROUTINE
DIMENSION GRAPH(1,1), YL(2,4), J(300)
DIMENSION IXP(6), IYP(4), MKST(4)
DATA (IRKPT(I), I=1,4)/42,16,38,63/
DATA IXP/6,25,4,28/
DATA IYP/776,776,611,411/
IF (NPLOT%.EQ.0) RETURN
KK = 1
XN1 = GRAPH(1,1)
YN1 = GRAPH(1,2)
XT1 = GRAPH(1,3)
YT1 = GRAPH(1,4)
XN2 = XN1
YN2 = YN1
XT2 = XT1
YT2 = YT1
DO 1 I=1, NP
  XN1 = AMIN1(GRAPH(I,1), XN1)
  YN1 = AMIN1(GRAPH(I,2), YN1)
  XT1 = AMIN1(GRAPH(I,3), XT1)
  YT1 = AMIN1(GRAPH(I,4), YT1)
  XN2 = AMAX1(GRAPH(I,1), XN2)
  YN2 = AMAX1(GRAPH(I,2), YN2)
  XT2 = AMAX1(GRAPH(I,3), XT2)
  YT2 = AMAX1(GRAPH(I,4), YT2)
  XMIN = AMIN1(XN1, XT1)
  YMIN = AMIN1(YN1, YT1)
  XMAX = AMAX1(XN2, XT2)
  YMAX = AMAX1(YN2, YT2)
  DELX = ABS(XMAX-XMIN)
  DELY = ABS(YMAX-YMIN)
  DEL = AMAX1(DELX, DELY)
  X1 = XMIN
  Y1 = YMIN-(DEL-DELY)/2.
  X2 = X1+DEL
  Y2 = Y1+DEL
  CALL CARAV (3)
  CALL DXDYV(X1, X2, DX, N, I, N(25), IERR)
  CALL LXDYV(X2, Y2, Y1, DY, M, J, M(25), IERR)
  CALL SETNIV (24, 0, 24, 24)
  CALL GRIDIV(K, X1, X2, Y2, Y1, X, DY, N, M, I, J, N(25), IERR)
  DO 2 J=1, 3, 2
    K = J+1
    UTIME = 0.
    IX1 = NPV(GRAPH(I,1), J)
    IY1 = NPV(GRAPH(I,1), K)
    DO 2 IJ=2, NP
      IX2 = NPV(GRAPH(IJ,1), J)
      IY2 = NPV(GRAPH(IJ,1), K)
      IF(IJ-1.5+JTIME) 7, 3, 3
      UTIME = T(IJ)
      CALL POINTV(IX2, IY2, -17, 2)
      7 IF(IJ-2) 4, 5, 5
      5 CALL POINTV(IX2, IY2, 3, 2)
      GO TO 6
      4 CALL LINEV(IX1, IY1, IX2, IY2)

```

```

6 IX1 = IX2
2 IY1 = IY2
60 CALL PRINTRV(12,YL(1,1),524,12)
CALL APRINTRV(0,-14,12,YL(1,2),12,524)
RETURN
C
ENTRY PLOT2
IF (NPLOT2.EQ.0) RETURN
JX = NPLOT4+1
JY1 = JX+1
JYN = NPLOT4+NPLOT2
X1 = GRAPH(1,JX)
X2 = X1
DO 110 I=2,NP
X1 = AMIN1 (GRAPH(I,JX),X1)
X2 = AMAX1 (GRAPH(I,JX),X2)
Y1 = GRAPH(1,JY1)
Y2 = Y1
DO 120 JY=JY1,JY4
DO 120 I=1,NP
Y1 = AMIN1 (GRAPH(I,JY),Y1)
Y2 = AMAX1 (GRAPH(I,JY),Y2)
CALL CAMRAV (3)
CALL OXDYV (1,X1,X2,JX,N,I,X,14,0,IERR)
CALL OXDYV (2,Y1,Y2,JY,M,J,Y,14,0,IERR)
CALL SETMINV (35,24,24)
CALL GRIDIV (1,X1,X2,Y1,Y2,JX,OY,N,M,I,J,-3,-3)
IMARK = 1
DO 140 JY=JY1,JYN
IX1 = NAV (GRAPH(1,JX))
IY1 = NYV (GRAPH(1,JY))
C
DO 130 IJ=2,NP
IX2 = NAV (GRAPH(IJ,JX))
IY2 = NYV (GRAPH(IJ,JY))
CALL LINEV (IX1,IY1,IX2,IY2)
CALL LINEV (IX1,IY1,IX2,IY2)
IX1 = IX2
IY1 = IY2
130 IY1 = IY2
IF (IMARK.GT.4) GO TO 140
CALL APLOTV (VP,GRAPH(1,JX),GRAPH(1,JY),20,20,1,NKPT(IMARK),IRR)
IMARK = IMARK + 1
CALL PRINTRV (12,YL(1,JX),456,6)
I = 1
DO 150 JY=JY1,JYN
IF (I.GT.6) GO TO 130
IY0 = IY(1) + 24
CALL PLOTV (IX(1),IY(1),IYQ,NKPT(1))
CALL APRINTRV (0,-14,12,YL(1,JY),INP(1),IY(1))
150 I = I + 1
RETURN
C
ENTRY PLOTN
NPLOT3 = NPLOT - NPLOT2 - NPLOT4
IF (NPLOT3.LE.0) RETURN
DO 160 MN=1,NPLOT3
JY = NPLOT4 + NPLOT2 + MN
EXEC 526
EXEC 527
EXEC 528
EXEC 529
EXEC 530
EXEC 531
EXEC 532
EXEC 533
EXEC 534
EXEC 535
EXEC 536
EXEC 537
EXEC 538
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EXEC 572
EXEC 573
EXEC 574
EXEC 575
EXEC 576
EXEC 577
EXEC 578
EXEC 579
EXEC 580
EXEC 581
EXEC 582

```

```

115      IX=MOD(NH,3)
      IF(IX .EQ. 0) IX=3
      I1=I2-344*(IX-1)
      JJ=28+344*(IX-1)
      KK=1
120      IF(I1X .GT. 1) KK=2
      K1=I1
      K2=I(AFI)
      Y1=GRAPH(I,JY)
      I2=Y1
125      DO 50 I=1,NP
      Y1=AMIN1(GRAPH(I,JY),Y1)
      Y2=AMAX1(GRAPH(I,JY),Y2)
      CALL CATRAVI9)
130      CALL GXYV(I,X1,X2,D,N,I,N(14),IER2)
      CALL GXYV(I2,Y1,Y2,D,M,J,NY,14),IER2)
      CALL SETIV(I24,0,II,JJ)
      CALL GRIDIV(KK,X1,X2,Y1,Y2,D,J,N,M,I,J,NK,-3)
      IX=NXV(I1)
      IY1=NYV(GRAPH(I1,JY))
135      DO 55 IJ=2,JP
      IY2=NXV(I1JJ)
      IY2=NYV(GRAPH(IJ,JY))
      CALL LINEV(IK1,IY1,IK2,IY2)
      IY1=IY2
140      55 IY1=IX2
      CALL FRINTV (-11,10HIME (SEC),460,696-344*(IX-1))
      100 CALL AFRNTV (-10,-16,12, -Y,(1,JY),4,890-344*(IX-1))
      RETURN
      END
EXEC 583
EXEC 584
EXEC 585
EXEC 586
EXEC 587
EXEC 588
EXEC 589
EXEC 590
EXEC 591
EXEC 592
EXEC 593
EXEC 594
EXEC 595
EXEC 596
EXEC 597
EXEC 598
EXEC 599
EXEC 600
EXEC 601
EXEC 602
EXEC 603
EXEC 604
EXEC 605
EXEC 606
EXEC 607
EXEC 608
EXEC 609
EXEC 610
EXEC 611
EXEC 612

```

SYMBOLIC REFERENCE MAP (R=3)

[illegible]

250

SUBROUTINE PLOT4 74/74 OPT=1

INLINE FUNCTIONS TYPE ARGS DEF LINE REFERENCES
MOD INTEGER 2 INTRIN 115

STATEMENT LABELS	DEF LINE	REFERENCES
0 1	26	19
0 2	59	43
0 3	INACTIVE	251
171 4	57	54
0 5	INACTIVE	254
173 6	58	55
164 7	54	51
0 50	127	125
0 55	140	135
0 100	142	113
0 110	73	71
0 120	79	75
0 130	35	93
350 140	99	85
403 150	107	102

LOOPS LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES
36 1	I	16 26	238	OPT
126 2	J	43 53	538	EXT REFS NOT INNER
142 2	IJ	48 59	378	EXT REFS
237 110	I	71 73	53	INSTACK
250 120	JY	76 79	138	NOT INNER
254 120	I	77 79	58	INSTACK
301 140	JY	86 99	538	EXT REFS NOT INNER
313 150	IJ	90 95	248	EXT REFS
363 150	JY	102 107	248	EXT REFS
426 100	NH	113 142	1178	EXT REFS NOT INNER
455 50	I	125 127	58	INSTACK
504 55	IJ	135 140	213	EXT REFS

STATISTICS	PROGRAM LENGTH
	11603
	624

	SUBROUTINE DUMMY	
	C DUMMY SUBROUTINE	
	ENTRY A21	EXEC 613
	ENTRY A4	EXEC 614
	ENTRY A5	EXEC 615
5	ENTRY A6	EXEC 616
	ENTRY A7	EXEC 617
	ENTRY A8	EXEC 618
	ENTRY A9	EXEC 619
	ENTRY B1	EXEC 620
	ENTRY B2	EXEC 621
10	ENTRY B3	EXEC 622
	ENTRY B4	EXEC 623
	ENTRY B5	EXEC 624
	ENTRY B6	EXEC 625
	ENTRY B7	EXEC 626
15	ENTRY B8	EXEC 627
	ENTRY B9	EXEC 628
	ENTRY C1	EXEC 629
	ENTRY C2	EXEC 630
	ENTRY C3	EXEC 631
20	ENTRY C4	EXEC 632
	ENTRY C5	EXEC 633
	ENTRY C6	EXEC 634
	ENTRY C7	EXEC 635
	ENTRY C8	EXEC 636
	ENTRY C9	EXEC 637
25	ENTRY D1	EXEC 638
	ENTRY D2	EXEC 639
	ENTRY D3	EXEC 640
	ENTRY D4	EXEC 641
	ENTRY D5	EXEC 642
30	ENTRY D6	EXEC 643
	ENTRY D7	EXEC 644
	ENTRY D8	EXEC 645
	ENTRY D9	EXEC 646
35	ENTRY E1	EXEC 647
	ENTRY E2	EXEC 648
	ENTRY E3	EXEC 649
	ENTRY E4	EXEC 650
	ENTRY E5	EXEC 651
40	ENTRY E6	EXEC 652
	ENTRY E7	EXEC 653
	ENTRY E8	EXEC 654
	ENTRY E9	EXEC 655
45	ENTRY F1	EXEC 656
	ENTRY F2	EXEC 657
	ENTRY F3	EXEC 658
	ENTRY F4	EXEC 659
	ENTRY F5	EXEC 660
50	ENTRY F6	EXEC 661
	ENTRY F7	EXEC 662
	ENTRY F8	EXEC 663
	ENTRY F9	EXEC 664
	ENTRY G1	EXEC 665
	ENTRY G2	EXEC 666

ENTRY CNTR1
ENTRY CNTR2

EXEC 667
EXEC 668
EXEC 669

SUBROUTINE DUMMY 7474 OPT=1

FIN 4.2+75067

05/05/75 16.24.27.

PAGE 2

ENTRY CNTR3
ENTRY INPT1
ENTRY INPT2
ENTRY INPT3
ENTRY CUP11
ENTRY PROCES
ENTRY RND41
ENTRY RND42
ENTRY RND43
ENTRY STSEL
ENTRY KXSEF
ENTRY COUNTV
ENTRY TIMEV
ENTRY WRITE
RETURN
END

60

EXEC 670
EXEC 671
EXEC 672
EXEC 673
EXEC 674
EXEC 675

65

EXEC 676
EXEC 677
EXEC 678
EXEC 679
EXEC 680
EXEC 681

70

EXEC 682
EXEC 683
EXEC 684
EXEC 685

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
1 AUXA1	47	
1 AUXA2	48	
1 AUXA3	49	
1 AUXB1	50	
1 AUXB2	51	
1 AUXB3	52	
1 AUXC1	53	
1 AUXC2	54	
1 AUXC3	55	
1 A21	3	
1 A4	4	
1 A41	5	
1 A5	6	
1 CNTR1	56	
1 CNTR2	57	
1 CNTR3	58	
1 COUNTV	69	
1 C10	19	
1 C101	20	
1 C3	7	
1 C31	8	
1 C5	9	
1 C51	10	
1 C6	11	
1 C61	12	
1 C7	13	
1 C71	14	
1 C8	15	
1 C81	16	
1 C9	17	
1 C91	18	
1 DUMNY	1	
1 O3	21	
1 O31	22	
1 O4	23	
1 O41	24	
1 O5	25	
1 O51	26	
1 G1	27	
1 G11	28	
1 G31	29	
1 G41	30	
1 G51	31	
1 G6	32	
1 G61	33	
1 INPT1	59	

1	INPT2	60
1	INPT3	61
1	KIKSET	68
1	OUPT1	62
1	PROCES	63
1	RNDM1	64
1	RNDM2	65
1	RNDM3	66

SUBROUTINE DUNNY 74/74 OPT=1

FTN 4.2+75067 05/05/75 16.24.27. PAGE 4

ENTRY POINTS	DEF LINE	REFERENCES
--------------	----------	------------

1	STGE1	67
1	S10	45
1	S101	46
1	S4	34
1	S41	35
1	S5	36
1	S51	37
1	S6	38
1	S61	39
1	S7	40
1	S71	41
1	S81	42
1	S9	43
1	S91	44
1	TINEV	70
1	WRITE	71
		72

STATISTICS

PROGRAM LENGTH	38	3
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```

SUBROUTINE TERROR (XLABEL)
  C% FOR USE WITH CODING2, FCM2, FCM3
  C
  COMMON-3(3030)
  EQUIVALENCE (C(2020),LCONV)
  WRITE (6,10) XLABEL
  10 FORMAT (10H0 NO ZERO POINTS SPECIFIED FOR ARG , 5X,
  C-7HTABLE ,A6)
  CALL EXIT
  END
  EXEC 686
  EXEC 687
  EXEC 688
  EXEC 689
  EXEC 690
  EXEC 691
  EXEC 692
  EXEC 693
  EXEC 694
  EXEC 695

```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
3 TERROR	1	10
VARIABLES		
0 C	REAL	ARRAY / /
3743 LCONV	INTEGER	/ /
0 XLABEL	REAL	F.P.
FILE NAMES		
0 TAPE6	FMT	ARIES 5
EXTERNALS		
EXIT	TYPE	ARGS 0
STATEMENT LABELS		
15 10	FMT	DEF LINE 7
COMMON BLOCKS		
/ /	LENGTH	MEMBERS - BIAS NAME(LENGTH)
	3030	0 C (3030)
EQUIV CLASSES		
C	LENGTH	MEMBERS - BIAS NAME(LENGTH)
	3030	2019 LCONV (1)
STATISTICS		
PROGRAM LENGTH		253 21
CH BLANK COMMON LENGTH		73663 3030

```

SUBROUTINE AEROR (X, LABEL)
COMMON C(3630)
EQUIVALENCE (C(2020), LCONV)
WRITE (6,23) X, LABEL
20 FORMAT (4,340)
C 7H1ABLE, 'AS I
00 40 I=1202,1251,7
40 WRITE(6,30) C(I),C(I+1),C(I+2),C(I+3),C(I+4),C(I+5),C(I+6)
30 FORMAT(1H,7E15,7)
10 WRITE (6,30) C(12000),C(367),C(368),C(204),C(359),C(370),C(1117),
C C(1118),C(1119),C(1120)
LCONV=2
RETURN
END
EXEC 695
EXEC 697
EXEC 698
EXEC 699
EXEC 700
EXEC 701
EXEC 702
EXEC 703
EXEC 704
EXEC 705
EXEC 706
EXEC 707
EXEC 708
EXEC 709
EXEC 703

```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS	DEF LINE	REFERENCES
3 AEROR	1	13

VARIABLES	SN	TYPE	RELOCATION	REFS	2	3	7*8	10*10
0 C	REAL	ARRAY	/ /	REFS	7*8	DEFINED	7	
100 I	INTEGER			REFS	3	DEFINED	12	
3743 LCONV	INTEGER			REFS	4	DEFINED	1	
0 XLABEL	REAL		F.P.	REFS				

FILE NAMES	MODE
TAPE6	FMT
	ARITES
	4
	8
	10

STATEMENT LABELS	DEF LINE	REFERENCES
36 20	FMT	5
60 30	FMT	9
0 40	FMT	8
		10
		7

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES	EXT	REFS
10	49	I	7	8	178		

COMMON BLOCKS	LENGTH	MEMBERS	- BIAS NAME(LENGTH)
/ /	3630	0 C	(3630)

EQUIV CLASSES	LENGTH	MEMBERS	- BIAS NAME(LENGTH)
C	3630	2319 LCONV (1)	

STATISTICS	PROGRAM LENGTH	CM BLANK COMMON LENGTH
	1013	65
	73663	3630

FUNCTION SIND 74/74 DPF=1 FTN 4.2+75057 05/05/75 15.24.38. PAGE 1
 FUNCTION SIND (X)
 SIND=SIN (X/57.29579)
 RETURN
 END
 EXEC 710
 EXEC 711
 EXEC 712
 EXEC 713

FUNCTION SIND 74/74 DPF=1 FTN 4.2+75057 05/05/75 15.24.38. PAGE 2
 SYMBOLIC REFERENCE MAP (R=3)
 ENTRY POINTS DEF LINE REFERENCES
 4 SIND 1 3
 VARIABLES SN TYPE RELOCATION
 12 SIND REAL
 0 X REAL
 F.P. DEFINED REFS
 2 2
 EXTERNALS TYPE ARGS REFERENCES
 SIND REAL 1 LIBRARY 2
 STATISTICS
 PROGRAM LENGTH 138 11

FUNCTION COSD	74/74	OPT=1	FTN 4.2+75067	05/05/75	16.24.30.	PAGE	1
FUNCTION COSD (X)							
COSD=COS-(X/57.29578)					EXEC		714
RETURN					EXEC		715
END					EXEC		716
					EXEC		717

FUNCTION COSD	74/74	OPT=1	FTN 4.2+75067	05/05/75	16.24.30.	PAGE	2
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SYMBOLIC REFERENCE MAP (R=3)							
ENTRY POINTS	DEF	LINE	REFERENCES				
4 COSD		1	3				
VARIABLES	SN	TYPE	RELOCATION				
12 COSD		REAL		DEFINED	2		
0 X		REAL	F.P.	REFS	2	DEFINED	1
EXTERNALS	TYPE	ARGS	REFERENCES				
COS	REAL	1	LIBRARY	2			
STATISTICS							
PROGRAM LENGTH			133				11

FUNCTION ATAND 74/74 OPT=1 FTN 4.2+75067 05/05/75 15.24.31. PAGE 1

FUNCTION ATAND (Y,X)
 ATAND= 57.23576*ATAN2-(Y,X)
 RETURN
 END

EXEC 718
 EXEC 719
 EXEC 720
 EXEC 721

FUNCTION ATAND 74/74 OPT=1 FTN 4.2+75067 05/05/75 16.24.31. PAGE 2

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS DEF LINE REFERENCES
 4 ATAND 1 3

VARIABLES SN TYPE RELOCATION
 13 ATAND REAL
 0 X REAL
 0 Y REAL
 F.P. 2
 F.P. 2
 REFS 2
 REFS 2

EXTERNALS ATAN2 TYPE ARGS REFERENCES
 REAL 2 LIBRARY 2

STATISTICS
 PROGRAM LENGTH 148 12

SUBROUTINE S2I		COMMON C(3830)		SUBROUTINE S2I		COMMON C(3830)		2	
C		C**OCS SEEKER-INITIALIZATION MODULE**		C		C		3	
5		C		C		C		4	
		C**HIGH FREQUENCY SEEKER		C		C		5	
		REAL KQ1,KQ2,KQ3,KQ4,KQ5,KQ6,KQ7,KQ8,KQ9,KQ10,KQ11,KQ12		C		C		6	
10		REAL KR1,KR2,KR3,KR4,KR5,KR6,KR7,KR8,KR9,KR10,KR11,KR12		C		C		7	
		REAL KUO,KUI,KBO,KBI,KPO,KPI,KOAO,KOAI		C		C		8	
		REAL JI,JJ		C		C		9	
		EQUIVALENCE (C(545), KQ1), (C(573), WTQ1)		C		C		10	
		EQUIVALENCE (C(545), KR1), (C(574), WTR1)		C		C		11	
		EQUIVALENCE (C(547), KQ2), (C(575), WTQ2)		C		C		12	
15		EQUIVALENCE (C(548), KR2), (C(576), WTR2)		C		C		13	
		EQUIVALENCE (C(549), KQ3), (C(577), WTR3)		C		C		14	
		EQUIVALENCE (C(550), KR3), (C(578), WTR4)		C		C		15	
		EQUIVALENCE (C(551), KQ3), (C(579), WTR5)		C		C		16	
		EQUIVALENCE (C(552), KR5), (C(580), WTR6)		C		C		17	
20		EQUIVALENCE (C(553), KQ5), (C(581), WTR7)		C		C		18	
		EQUIVALENCE (C(554), KR6), (C(582), WTR8)		C		C		19	
		EQUIVALENCE (C(555), KQ7), (C(583), WTR9)		C		C		20	
		EQUIVALENCE (C(556), KR7), (C(584), WTR10)		C		C		21	
		EQUIVALENCE (C(557), KQ8), (C(585), WTR11)		C		C		22	
25		EQUIVALENCE (C(558), KR8), (C(586), WTR12)		C		C		23	
		EQUIVALENCE (C(559), KQ11), (C(587), WTR13)		C		C		24	
		EQUIVALENCE (C(560), KR10), (C(588), WTR14)		C		C		25	
		EQUIVALENCE (C(561), KQ11), (C(589), WTR15)		C		C		26	
		EQUIVALENCE (C(562), KR11), (C(590), WTR16)		C		C		27	
30		EQUIVALENCE (C(563), KQ12), (C(591), WTR17)		C		C		28	
		EQUIVALENCE (C(564), KQ12), (C(592), WTR18)		C		C		29	
		EQUIVALENCE (C(565), JI), (C(593), WTR19)		C		C		30	
		EQUIVALENCE (C(565), JO), (C(594), WTR20)		C		C		31	
		EQUIVALENCE (C(567), FRI), (C(595), WTR21)		C		C		32	
35		EQUIVALENCE (C(568), FRI), (C(596), WTR22)		C		C		33	
		EQUIVALENCE (C(569), TUI), (C(597), WTR23)		C		C		34	
		EQUIVALENCE (C(570), TUI), (C(598), WTR24)		C		C		35	
		EQUIVALENCE (C(571), QER), (C(599), WTR25)		C		C		36	
		EQUIVALENCE (C(572), RER), (C(600), WTR26)		C		C		37	
40		EQUIVALENCE (C(480), GQ1), (C(482), WTR27)		C		C		38	
		EQUIVALENCE (C(481), GQ1), (C(483), WTR28)		C		C		39	
		EQUIVALENCE (C(484), GQ3), (C(486), WTR29)		C		C		40	
		EQUIVALENCE (C(485), GQ3), (C(487), WTR30)		C		C		41	
45		EQUIVALENCE (C(490), GQ5), (C(492), WTR31)		C		C		42	
		EQUIVALENCE (C(491), GQ5), (C(493), WTR32)		C		C		43	
		EQUIVALENCE (C(601), TART), (C(602), WTR33)		C		C		44	
		C**INPUTS FROM OTHER MODULES**		C		C		45	
		EQUIVALENCE (C(1751), CRAD)		C		C		46	
50		EQUIVALENCE (C(371), RANGE)		C		C		47	
		C**STATE VARIABLES		C		C		48	
		EQUIVALENCE (C(424), BTHG0), (C(427), BTHG3)		C		C		49	
		EQUIVALENCE (C(428), BPSIG0), (C(431), BPSIG3)		C		C		50	
55		EQUIVALENCE (C(500), DQ1), (C(503), DQ1)		C		C		51	
		EQUIVALENCE (C(501), DR1), (C(504), DR1)		C		C		52	
		EQUIVALENCE (C(506), DQ2), (C(509), DQ2)		C		C		53	
				C		C		54	
				C		C		55	
				C		C		56	
				C		C		57	
				C		C		58	

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TUO=0.
GQ1=KQ1*K32/CRAD
GRI=KR1*KR2/CRAD
175 GQ2=KQ3*W12/ATQ1
GQ2=KR3*W12/ATQ1
GQ3=KQ5*WQ6*45Q6*4734/45Q1*WQ3*WQ35
GQ3=KR5*WQ6*45Q6*4734/45Q1*WQ3*WQ35
GQ4=KQ6*KQ7
GQ4=KR6*KQ7
180 GQ5=KQ10*W12*WQ2/CRAD
GQ5=KR10*W12*WQ2/CRAD
GQ6=KQ11*W12*WQ2
GQ6=KR11*W12*WQ2
185 GQ7=KQ12*W12*WQ2
GQ7=KR12*W12*WQ2
RANGE=SQRT(C(1635)*C(1636)*C(1637)*C(1638))
THQ=ATAND(TARH,RANGE)/2.
THR=ATAND(TARH,RANGE)/2.
IQC=-10
C
190 IF(IIS3-EQ.0) GO TO 5
GQ3=KQ5*WQ4/WQ1/WQ3
GQ3=KR5*WQ4/WQ1/WQ3
GQ5=KQ10*K311/CRAD
GQ5=KR10*K311/CRAD
195 GQ6=KQ11/K311/CRAD
GQ6=KR11/K311/CRAD
C
C DO 30 I=1,13512
C IDO=1
C
C**MONT CARLO MASS UNBALANCE ON SEEKER GYRO
C
IF(IISNOX(I).EQ.611)CALL MCARLO(DUM,1,100)
IF(IISNOX(I).EQ.611)CALL RANUM(0.,RNSTRT,RN)
KUO=SIGN(KUO,RN)
205 IF(IISNOX(I).EQ.612)CALL MCARLO(DUM,1,100)
IF(IISNOX(I).EQ.612)CALL RANUM(0.,RNSTRT,RN)
CHI=366.*RN
C
C**MONT CARLO SEEKER RATE GYRO ERRORS
C
210 IF(IISNOX(I).EQ.613)CALL MCARLO(DUM,1,100)
IF(IISNOX(I).EQ.614)CALL MCARLO(DUM,1,100)
IF(IISNOX(I).EQ.615)CALL MCARLO(DUM,1,100)
IF(IISNOX(I).EQ.615)CALL RANUM(0.,RNSTRT,RN)
215 CHIG=360.*RN
IF(IISNOX(I).EQ.616)CALL MCARLO(DUM,1,100)
IF(IISNOX(I).EQ.617)CALL MCARLO(DUM,1,100)
IF(IISNOX(I).EQ.618)CALL MCARLO(DUM,1,100)
UCG=CO50(CHIG)
220 USC=SIND(CHIG)
UCG=CO50(CHIG)
UCG=SIND(CHIG)
C
30 CONTINUE
RETURN
225 END

```


266

VARIABLES	SN	TYPE	RELOCATION	REFS
5000 N		INTEGER	/ /	
6657 OPTN4		REAL	/ /	76
1672 QERG		REAL	/ /	114
766 Q1		REAL	/ /	124
774 Q2		REAL	/ /	131
1002 Q3		REAL	/ /	139
1013 Q4		REAL	/ /	REFS
1024 Q5		REAL	/ /	REFS
1035 Q6		REAL	/ /	REFS
562 RANGE		REAL	/ /	REFS
1132 RBLOCK		REAL	/ /	REFS
1124 RCL		REAL	/ /	REFS
1073 RERG		REAL	/ /	REFS
427 RN		REAL	/ /	REFS
426 RNSTR		REAL	/ /	REFS
767 R1		REAL	/ /	REFS
775 R2		REAL	/ /	REFS
1003 R3		REAL	/ /	REFS
1014 R4		REAL	/ /	REFS
1025 R5		REAL	/ /	REFS
1036 R6		REAL	/ /	REFS
1130 TARMT		REAL	/ /	REFS
1131 TARND		REAL	/ /	REFS
1127 TAU		REAL	/ /	REFS
1125 TCLQ		REAL	/ /	REFS
1126 TCLR		REAL	/ /	REFS
1137 TDELAY		REAL	/ /	REFS
1140 THIQ		REAL	/ /	REFS
1141 THTR		REAL	/ /	REFS
1023 TIMESV		REAL	/ /	REFS
1070 TUI		REAL	/ /	REFS
1071 TUO		REAL	/ /	REFS
1152 UCC		REAL	/ /	REFS
1154 UCCG		REAL	/ /	REFS
1153 USC		REAL	/ /	REFS
1155 USC		REAL	/ /	REFS
1100 MGQ1		REAL	/ /	REFS
1102 MGQ2		REAL	/ /	REFS
1104 MGQ3		REAL	/ /	REFS
1106 MGQ4		REAL	/ /	REFS
1110 MGQ5		REAL	/ /	REFS
1112 MGQ6		REAL	/ /	REFS
1101 MGR1		REAL	/ /	REFS
1103 MGR2		REAL	/ /	REFS
1105 MGR3		REAL	/ /	REFS
1107 MGR4		REAL	/ /	REFS
1111 MGR5		REAL	/ /	REFS
1113 MGR6		REAL	/ /	REFS
1012 MI		REAL	/ /	REFS
1004 MO		REAL	/ /	REFS
1114 WRQ1		REAL	/ /	REFS
1116 WRQ2		REAL	/ /	REFS
1120 WRQ3		REAL	/ /	REFS

VARIABLES	SN	TYPE	RELOCATION	REFS
1122 WRR4	REAL	/	/	34
1115 WRR1	REAL	/	/	29
1117 WRR2	REAL	/	/	31
1121 WRR3	REAL	/	/	33
1123 WRR4	REAL	/	/	35
1074 WTR1	REAL	/	/	12
1076 WTR2	REAL	/	/	14
1075 WTR1	REAL	/	/	175
1077 WTR2	REAL	/	/	176
1078 WTR1	REAL	/	/	176
1079 WTR2	REAL	/	/	176

FILE NAMES	MODE	WRITES	9%
TAPE6	FMT		

EXTERNALS	TYPE	ARGS	REFERENCES
ATAND	REAL	2	185
COSD	REAL	1	219
MCARLG	REAL	3	202
RANUM	REAL	3	203
SIND	REAL	1	220
SQRT	REAL	1	220
	REAL	1	LIBRARY 185

INLINE FUNCTIONS	TYPE	ARGS	DEF LINE	REFERENCES
SIGN	REAL	2	INTRIN	204

STATEMENT LABELS	DEF LINE	REFERENCES
0 1	145	144
132 3	163	153
236 6	135	190
0 7	152	149
36 10	119	103
101 20	143	113
0 30	223	97
364 112	95	94

LOOPS	LABEL	INDEX	FROM-TO	LENGTH	PROPERTIES
103 1	1	144	145	28	INSTACK
113 7	1	148	152	78	INSTACK
237 30	1	197	223	778	EXT REFS

COMMON BLOCKS	LENGTH	MEMBERS	BIAS NAME(LENGTH)
/	3830	0 C	(3930)

EQUIV CLASSES	LENGTH	MEMBERS	BIAS NAME(LENGTH)
C	3830	370 RANGE (1)	426 BTHIC (1)
		427 BPSIG (1)	479 GQ1 (1)
		480 G31 (1)	482 GK2 (1)
		483 GQ3 (1)	485 GQ4 (1)
		486 GR8 (1)	489 GR5 (1)
		490 G06 (1)	499 DQ1 (1)
		500 D41 (1)	503 R1 (1)
		505 U72 (1)	508 Q2 (1)
		509 R2 (1)	512 DR3 (1)
		513 D40 (1)	515 R3 (1)
		516 W0 (1)	518 DOR4 (1)
		519 W41 (1)	521 OR4 (1)
		522 W1 (1)	524 R4 (1)
		525 MESSYSV(1)	527 DOR5 (1)

EQUIV CLASSES	LENGTH	MEMBERS	BIAS NAME (LENGTH)
529 REPSZSV(1)		529 D25	(1)
531 TIMES7 (1)		532 D5	(1)
535 DQ6 (1)		533 R5	(1)
539 DR5		538 DQ6	(1)
544 KQ1 (1)		542 R6	(1)
547 KR2 (1)		543 K21	(1)
550 KQ5 (1)		549 KR3	(1)
553 KR6 (1)		551 KR5	(1)
556 KQ8 (1)		554 KQ7	(1)
559 K210 (1)		557 K28	(1)
562 K212 (1)		560 K211	(1)
565 J1		563 K212	(1)
568 TUI (1)		565 F21	(1)
571 KERG (1)		569 TJO	(1)
574 WT22 (1)		572 WT21	(1)
577 W221 (1)		575 WT22	(1)
580 MG23 (1)		578 W222	(1)
583 W224 (1)		581 W223	(1)
586 W225 (1)		584 W225	(1)
589 W226 (1)		587 W226	(1)
592 W227 (1)		590 W227	(1)
595 W228 (1)		593 W228	(1)
598 W229 (1)		595 W229	(1)
601 W230 (1)		599 TAU	(1)
607 TDELAY (1)		602 RBLOCK	(1)
610 KUD (1)		608 TATQ	(1)
613 K21		611 K21	(1)
616 K22		614 K22	(1)
619 USC		617 K23	(1)
622 UERSV (1)		620 UCCG	(1)
2561 IPL (100)		1750 CRAD	(1)
3633 ISNDX (40)		3503 OPTN4	(1)
		3511 I3512	(1)

STATISTICS
PROGRAM LENGTH 4323 282
CM BLANK COMMON LENGTH 73668 3830


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      EQUIVALENCE (C( 503), TARM), (C( 502), TARM)
      EQUIVALENCE (C( 504), FFOU)
      EQUIVALENCE (C( 608), TDELAY), (C( 609), THTQ), (C( 610), THTR)
      EQUIVALENCE (C( 506), TLAG)

      C
      C**INPUTS FROM OTHER MODULES**
      EQUIVALENCE (C( 372), RXBA)
      EQUIVALENCE (C( 373), RYBA)
      EQUIVALENCE (C( 374), RZBA)
      EQUIVALENCE (C( 1739), WP)
      EQUIVALENCE (C( 1743), WJ)
      EQUIVALENCE (C( 1747), WJ)
      EQUIVALENCE (C( 1751), CRAD)
      EQUIVALENCE (C( 2000), TIME)
      EQUIVALENCE (C( 371), RANGE)
      EQUIVALENCE (C( 1675), ANGK)
      EQUIVALENCE (C( 1577), ANGY)
      EQUIVALENCE (C( 1578), ANGZ)
      EQUIVALENCE (C( 1738), WPJ)
      EQUIVALENCE (C( 1740), WQJ)
      EQUIVALENCE (C( 1744), WQJ)
      EQUIVALENCE (C( 550), TIMESV)
      EQUIVALENCE (C( 556), LOSZ)
      EQUIVALENCE (C( 562), LOSY)

      REAL LCSZ, LOSY
      DIMENSION TIMESV(5), LOSZ(6), LOSY(6), XL(2)

      C
      C**STATE VARIABLES
      EQUIVALENCE (C( 424), BHTGJ), (C( 427), BHTGJ)
      EQUIVALENCE (C( 428), BPSIGJ), (C( 431), BPSIGJ)
      EQUIVALENCE (C( 500), DQ1), (C( 503), DQ1)
      EQUIVALENCE (C( 501), DRI), (C( 504), DRI)
      EQUIVALENCE (C( 506), DQ2), (C( 509), DQ2)
      EQUIVALENCE (C( 507), DR2), (C( 510), DR2)
      EQUIVALENCE (C( 512), DQ3), (C( 515), DQ3)
      EQUIVALENCE (C( 513), DR3), (C( 516), DR3)
      EQUIVALENCE (C( 514), DMJ), (C( 517), DMJ)
      EQUIVALENCE (C( 518), DDQJ), (C( 521), DDQJ)
      EQUIVALENCE (C( 519), DORJ), (C( 522), DORJ)
      EQUIVALENCE (C( 520), DMJ), (C( 523), DMJ)
      EQUIVALENCE (C( 527), DORJ), (C( 530), DORJ)
      EQUIVALENCE (C( 528), DORJ), (C( 531), DORJ)
      EQUIVALENCE (C( 535), DORJ), (C( 539), DORJ)
      EQUIVALENCE (C( 537), DORJ), (C( 540), DORJ)

      C
      C**OTHER OUTPUTS
      EQUIVALENCE (C( 435), BEPSZ)
      EQUIVALENCE (C( 436), BEPSY)
      EQUIVALENCE (C( 403), WLARJ)
      EQUIVALENCE (C( 407), WLARJ)
      EQUIVALENCE (C( 525), BEPSYV)
      EQUIVALENCE (C( 529), BEPSZV)
      EQUIVALENCE (C( 493), DTHCRJ)
      EQUIVALENCE (C( 495), DTHCRJ)
      EQUIVALENCE (C( 2020), LCONJ), (C( 625), LBL)
      EQUIVALENCE (C( 607), BRKQ)

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115 C**MONTE CARLO PARAMETERS
C
EQUIVALENCE (C(5634), ISNDK), (C(3512), I3512)
EQUIVALENCE (C( 611), KUD), (C( 612), KUT)
EQUIVALENCE (C( 513), KBD), (C( 614), KBI)
EQUIVALENCE (C( 615), KPD), (C( 616), KPI)
EQUIVALENCE (C( 517), KOAD), (C( 618), KOAI)
EQUIVALENCE (C( 619), UC2), (C( 620), USC2)
EQUIVALENCE (C( 521), UCC3), (C( 622), USC3)
DATA F0V/4./
125 C
C INTEGRATION SWITCHING TEST
C
C SYNCHRONIZE INTEGRATION WITH SAMPLE SIZE
IF (C(113).LE.0.160 TO 1
C(113)=-1.
130 C(2664)=IAU/AINT(IAU/C(2764))
1 C CONTINUE
C
C**DIRECTION COSINES FOR BODY TO PLATFORM TRANSFORMATION
C
UCI=CCSD(8THF)
UST=SIND(8THF)
UCP=COSD(8PSTG)
USP=SIND(8PSTG)
UB11=UCI*UCP
UB12=USP
UB13=-UCP*UST
UB21=-UCI*USP
UB22=UCP
UB23=UST*USP
UB31=UST
UB32=0.
UB33=UCI
140 C
C**TRANSFORM LOS FROM BODY TO GIMBAL AXES
RXG=UB11*RX3A+UB12*RY3A+UB13*RZ3A
RYG=UB21*RX3A+UB22*RY3A+UB23*RZ3A
RZG=UB31*RX3A+UB32*RY3A+UB33*RZ3A
IF (I3512.LE.0) GO TO 5
C**GYRO ERRORS
C
C**TRANSFORM NORMALIZED ACCELERATIONS FROM BODY TO GIMBAL AXES
ANGXG=UB11*ANGX+UB12*ANGY+UB13*ANGZ
ANGYG=UB21*ANGX+UB22*ANGY+UB23*ANGZ
ANGZG=UB31*ANGX+UB32*ANGY+UB33*ANGZ
ANG=ANGZG*UCC3-ANGYG*USC3
QERG=KBD+CPJ*ANG+KOAI*HPJ
RERG=KBI+KPI*ANG+KOAI*HPJ
TUD=KUO*(ANGX*UCI-ANGY*UST)
TUI=KUI*(ANGY*UCC-ANGX*USC)
CONTINUE
5 C
C**LOS ERRORS IN PLATFORM COORDINATES
IF (C(1576).LE.0.150 TO 32
BEPST=ATAND(-RZG,RXG)
BEPST=ATAND( RYG,RXG)
BEPST=ATAND( RYG,RXG)
170 C**SAVE EVERY FIFTH POINT OF BEPSZ AND BEPSY FOR FLAG
FLAG=FLAG+1

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IF(LAG,LT,5163) TO 4
LAG=0
DO 2 L=2,6
  TIMESV(L-1)=TIMESV(L)
  LCSZ(L-1)=LCSZ(L)
  LOSY(L-1)=LOSY(L)
2 CONTINUE
4 CONTINUE
TIMESV(6)=TIME
LCSZ(6)=BEPJZ
LOSY(6)=BEPJZ
32 CONTINUE
C TRACKER LOOP
C
C**ZOH (TDelay,TAU) AND TIME DELAY (TLAG)
IF(TIME,LT,(TDelay-.00001)*JR,2(1976).LE,0.130 TO 30
  TDELAY=TIME+TAU
  THIQ=ATAND(TANH(2.,RANGE))
  THIR=ATAND(TANH(2.,RANGE))
  BRLXO=(BEPJZ-BEPJZSV)/(2.*THIQ)
  BRLXR=(BEPJZ-BEPJZSV)/(2.*THIR)
  TLAG=TIME-TLAG $ N=6 $ F=0.
  BEPSZSV=FINTP1( TLAG,TIMESV,LOSZ,N,F,XL)
  BEPSZSV=FINTP1( TLAG,TIMESV,LOSZ,N,F,XL)
  IF(ABS(BRLX1).LT,.5 .AND. ABS(BRLXR).LT,.5)30 TO 30
C**BREAKLOCK DETERMINATION
200 IF(LOCS.NE.-10)60 TO 30
  LOCS=-9
  IBL=IBL+1
  LCONV=2
  WHICH = 104 IN PITCH
  IF(ABS(BRLXR).GE,.5)WHICH = 104 IN YAW
  WRITE(6,101)TIME,RANGE,WHICH
101 FORMAT(1H0,100(1+),/ * BREAK LOCK CONDITION AT TIME = *F5.2,
  + * RANGE = *F10.2,A10,/100(1H*))
30 CONTINUE
210 DELAYO=GQ1*3EPSZSV
  DELAYA=GQ1*3EPSZSV
  GQ1= DELAY2-W102*Q1
  DR1= DELAYR-W102*Q1
  OTHCO=(Q01+ATQ1*Q1)*Q2
  OTHCR=(Q01+ATQ1*Q1)*Q2
  RATE COMNAV LIMIT
C
  IF(ABS(OTHCO).GE,RCL)OTHCO=SIGN(RCL,OTHCO)
  IF(ABS(OTHCR).GE,RCL)OTHCR=SIGN(RCL,OTHCR)
C
220 C RATE GRD LOOP
C
  W1Q=NO*UCP-(WP*UCT-WR*UST)*JSP
  OQ3= (W1J+2ER3)-WR32*Q35-WR32*WR32*Q3
  OOR5= (W1+2ER3)-WR22*Q25-WR22*WR22*Q5
  OOR6=GQ5*Q3-WRQ4*Q36-WRQ4*WRQ4*Q6
  OTHRC=KJ12*Q5*Q6
  OTHROK=KR12*Q5*Q35

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230 C
C** BLIND RANGE DETERMINATION
THQAO=THQ+ABS(BEPSZ)
THQAR=THQ+ABS(BEPSY)
BLNQ=THQ+2./FJV
BLNR=THQ+2./FOV
TESTFOV=FOV*2.
IF(THQAO.LT.TESTFOV.AND.THQAR.LT.TESTFOV) GO TO 20
IF(FOCS.LE.1)WRITE(3,100)TIME,RANGE
100 FORMAT(1H0,100(14*))// OCS BLIND RANGE SIGNAL HOLD AT TIME = *F5.2,
* RANGE = *F10.2/100(14*))
FOCS=1L
GO TO 21
20 CONTINUE
WLNG=GS*GS*3E2S
WLNR=R6*GR*GECS
IF(APSC(53)) .LT. ABS(BRLKQ) C(636)=3RLCQ
IF(ABS(C(63)) .LT. ABS(BRLKR) C(633)=9RLKR
21 CONTINUE
C
250 C JAIN COMPENSATION
DTATEQ=DTMC1-DTHRGQ
DTHIER=DTMC2-DTHGR
DQ2= DTHIEQ
DQ3= DTHIER
DQ3=DQ2+GQ1*32-MG34*Q3
DQ3=DR2+GRI*32-MGR4*R3
DDQ4=UG3+MG33*Q3-MG05*Q4-MJQG*MG06*Q4
DDR4=UE3+MG33*R3-MGR5*DR4-MJRG*NGR6*R4
260 C SEEKER TORQUE MOTOR
C
C
TQ=(MG05*Q4+DQ4)*G33
TR=(MGR5*R4+DR4)*GR3
IF(ABS(TQ).GT.TCLQ) TQ=SIGN(TCLQ,TQ)
IF(ABS(TR).GT.TCLR) TR=SIGN(TCLR,TR)
TMQ=GQ4*TQ
TPR=GR4*TR
270 C SEEKER JIMBAL ANGLE RATES
C
C**COULOMB FRICTION MODEL
TCOMQ=Q08*BTHTG/CR40
IF(ABS(BTHTG0).LE.4.E-4)GO TO 70
TFQ=
SIGN(FR0,3THTG0)
TAQ=TMQ-TFQ-TCOMQ-TJJ
DNO=TAG*CRAD/J0
GO TO 73
70 CONTINUE
TFQ=TAQ-TCOMQ-TU0
IF(ABS(TFQ).GT.FR0) TFQ=SIGN(FR0,TFQ)
MCQ3=(TFQ+SIGN(FR0,M20))*CRAD/J0
DMBAQ=M20
IF(ABS(M20).GT.ABS(M20Q))DM3AQ=MCQ3
TAQ=TAQ-TFQ-TCOMQ-TJJ
280
285

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DWAR=TAJ/JO*CRAY
DWO=DWAR*CHAI
CONTINUE
73
ICOR=K8*9PSIG/CRAD
IF(ABS(PSIGD).LE.4.E-4)GO TO 80
TFR=SIGN(FRI,9PSIGD)
TAR=IMR-TFR-TCOR-TJI
DWI=TAR*CRAY/JI
GO TO 63
295
CONTINUE
WRES=UCT*WRD+JST*WP
TFR=IMR-TCOR-TJI
IF(ABS(TFR).GT.FRI)TFR=SIGN(FRI,TMR)
MOR=(TFR+SIGN(FRI,WRES))*CRAD/JI
300
DWAR=WRES
IF(ABS(WRES).GT.ABS(MOR))DWAR=MOR
TAR=IMR-TFR-TCOR-TJI
DWAR=TAR/JI*CRAY
DWI=DWAR*CHAI
CONTINUE
83
BTHTGL=MO-WJ
BPSIGD=MI-(4R*JCI+WP*UST)
3
CONTINUE
RETURN
310
END

```

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS DEF LINE REFERENCES

1 S2 1 309

VARIABLES SN TYPE RELOCATION

703 ANG	REAL	150	REFS	161	DEFINED	159	
3213 ANG	REAL	73	REFS	156	157	158	162
700 ANGKG	REAL	153	REFS	156	156		
3214 ANGY	REAL	74	REFS	156	157	158	
701 ANGYG	REAL	159	REFS	153	DEFINED	157	
3215 ANGZ	REAL	75	REFS	156	157	158	162
702 ANGZG	REAL	159	REFS	156	157	158	
663 BEPSY	REAL	105	REFS	182	233	DEFINED	159
1015 BEPSYS	REAL	108	REFS	194	211	DEFINED	197
662 BEPSZ	REAL	104	REFS	181	232	DEFINED	158
1020 BEPSZSV	REAL	109	REFS	193	210	DEFINED	196
720 BLNDQ	* REAL	234	REFS				
721 BLNDQ	* REAL	235	REFS				
656 BPSIG	REAL	37	REFS	136	137	209	
653 UPSIGO	REAL	97	REFS	290	291	DEFINED	307
1136 BLKQ	REAL	113	REFS	198	2246	DEFINED	193
706 BLKR	REAL	138	REFS	205	2247	DEFINED	194
652 BHTG	REAL	36	REFS	134	135	273	
647 BHTGD	REAL	56	REFS	274	275	DEFINED	306
0 C	REAL	16	REFS	222	223	224	225
	ARRAY	229	REFS	230	231	232	233
		237	REFS	238	239	240	241
		245	REFS	246	247	248	249
		253	REFS	254	255	256	257
		51	REFS	64	65	66	67
		71	REFS	72	73	74	75
		77	REFS	90	91	92	93
		291	REFS	292	293	294	295
		399	REFS	3100	3101	3104	3105
		119	REFS	2110	2111	2112	2113
		2120	REFS	2121	2122	2123	2124
		246	REFS	247	248	249	250
		70	REFS	273	277	282	289
3326 CRAD	REAL	333	REFS	258	259	260	261
1005 DQ04	REAL	35	REFS	258	259	260	261
1016 DQ05	REAL	98	REFS	258	259	260	261
1027 DQ06	REAL	100	REFS	258	259	260	261
1006 DQ04	REAL	96	REFS	258	259	260	261
1017 DQ05	REAL	99	REFS	258	259	260	261
1030 DQ06	REAL	101	REFS	258	259	260	261
713 DELAYQ	REAL	212	REFS	210	211	212	213
714 DELAYR	REAL	213	REFS	210	211	212	213
763 DQ1	REAL	92	REFS	214	215	216	217
771 DQ2	REAL	90	REFS	256	257	258	259
777 DQ3	REAL	92	REFS	258	259	260	261
1010 DQ4	REAL	95	REFS	258	259	260	261
1021 DQ5	REAL	98	REFS	258	259	260	261
1032 DQ6	REAL	100	REFS	258	259	260	261
764 DR1	REAL	89	REFS	215	216	217	218
772 DR2	REAL	91	REFS	257	258	259	260
1000 DR3	REAL	93	REFS	259	260	261	262

[illegible]

VARIABLES	SN	TYPE	RELOCATION	
655 KQ9	*	REAL	UNDEF	REFS
1041 KR1		REAL	/ /	17
1057 KR10		REAL	/ /	18
1061 KR11		REAL	/ /	18
1063 KR12		REAL	/ /	18
1043 KR2		REAL	/ /	18
1045 KR3		REAL	/ /	18
656 KR4	*	REAL	UNDEF	REFS
1047 KR5		REAL	/ /	18
1051 KR6		REAL	/ /	18
1053 KR7		REAL	/ /	18
1055 KR8		REAL	/ /	18
657 KR9	*	REAL	UNDEF	REFS
1143 KUI		REAL	/ /	18
1142 KU0		REAL	/ /	18
705 L		INTEGER	/ /	18
3743 LCONV		INTEGER	/ /	18
1225 LOSY		REAL	ARRAY	REFS
1217 LOSZ		REAL	ARRAY	REFS
710 N		INTEGER	/ /	REFS
1072 QERG		REAL	/ /	REFS
766 Q1		REAL	/ /	REFS
774 Q2		REAL	/ /	REFS
1002 Q3		REAL	/ /	REFS
1013 Q4		REAL	/ /	REFS
1024 Q5		REAL	/ /	REFS
1035 Q6		REAL	/ /	REFS
562 RANGE		REAL	/ /	REFS
1132 RBLOCK		REAL	/ /	REFS
1124 RCL		REAL	/ /	REFS
1073 RERG		REAL	/ /	REFS
563 RXBA		REAL	/ /	REFS
675 RXG		REAL	/ /	REFS
564 RYBA		REAL	/ /	REFS
676 RYG		REAL	/ /	REFS
565 RZBA		REAL	/ /	REFS
677 RZG		REAL	/ /	REFS
767 R1		REAL	/ /	REFS
775 R2		REAL	/ /	REFS
1003 R3		REAL	/ /	REFS
1014 R4		REAL	/ /	REFS
1025 R5		REAL	/ /	REFS
1036 R6		REAL	/ /	REFS
733 TAC		REAL	/ /	REFS
741 TAR		REAL	/ /	REFS
1130 TARM1		REAL	/ /	REFS
1131 TARM2		REAL	/ /	REFS
1127 TAU		REAL	/ /	REFS
1125 TCLQ		REAL	/ /	REFS
1126 TCLR		REAL	/ /	REFS
731 TCOMQ		REAL	/ /	REFS
737 TCOMR		REAL	/ /	REFS
1137 TOLAY		REAL	/ /	REFS
722 TESTFOV		REAL	/ /	REFS
732 TFQ		REAL	/ /	REFS

VARIABLES SN TYPE RELOCATION

740	TFR	REAL	281	292	298	299	302	DEFINED	291	297
716	THIOAQ	REAL	REFS	234	237	DEFINED	232			
717	THIOAR	REAL	REFS	235	237	DEFINED	233			
1140	THIQ	REAL	REFS	50	193	232	DEFINED	191		
1141	THIR	REAL	REFS	50	194	233	DEFINED	192		
3717	TIME	REAL	REFS	71	100	189	190	206		238
1211	TIMEV	REAL	REFS	79	83	175	196	197		
	ARRAY	REAL	REFS	79	83	175	196	197		
1135	TLAG	REAL	DEFINED	175	100					
727	THQ	REAL	REFS	51	195					
730	THR	REAL	REFS	276	200	281	285	DEFINED	257	
725	TQ	REAL	REFS	292	297	298	302	DEFINED	268	
726	TR	REAL	REFS	2*265	267	DEFINED	263	265		
		REAL	REFS	2*266	268	DEFINED	264	266		
707	TTLAQ	REAL	REFS	196	197	DEFINED	195			
1070	TUI	REAL	REFS	46	292	297	302	DEFINED	163	
1071	TUO	REAL	REFS	47	276	280	285	DEFINED	162	
664	UB11	REAL	REFS	149	156	DEFINED	138			
665	UB12	REAL	REFS	149	156	DEFINED	139			
666	UB13	REAL	REFS	149	156	DEFINED	140			
667	UB21	REAL	REFS	150	157	DEFINED	141			
670	UB22	REAL	REFS	150	157	DEFINED	142			
671	UB23	REAL	REFS	150	157	DEFINED	143			
672	UB31	REAL	REFS	151	158	DEFINED	144			
673	UB32	REAL	REFS	151	158	DEFINED	145			
674	UB33	REAL	REFS	151	158	DEFINED	146			
1152	UCG	REAL	REFS	122	133					
1154	UCGG	REAL	REFS	123	139					
662	UCP	REAL	REFS	138	140	142	222	DEFINED	136	
660	UCT	REAL	REFS	138	141	146	162	222	296	302
		REAL	DEFINED	134						
1153	USC	REAL	REFS	122	133					
1155	USCG	REAL	REFS	123	139					
663	USP	REAL	REFS	139	141	143	222	DEFINED	137	
661	UST	REAL	REFS	140	143	144	162	222	296	302
		REAL	DEFINED	135						
734	WCOQ	REAL	REFS	2*284	DEFINED	282				
743	WCOR	REAL	REFS	2*301	DEFINED	299				
1100	MGQ1	REAL	REFS	26	256					
1102	MGQ2	REAL	REFS	28						
1104	MGQ3	REAL	REFS	30	258					
1106	MGQ4	REAL	REFS	32	256					
1110	MGQ5	REAL	REFS	34	263					
1112	MGQ6	REAL	REFS	36	3*258					
1101	MGR1	REAL	REFS	27	257					
1103	MGR2	REAL	REFS	29						
1105	MGR3	REAL	REFS	31	259					
1107	MGR4	REAL	REFS	33	257					
1111	MGR5	REAL	REFS	35	254					
1113	MGR6	REAL	REFS	37	3*259					
712	WHICH	REAL	REFS	206	DEFINED	204	205			
1012	WI	REAL	REFS	97	224	307				
622	WLANQ	REAL	REFS	106	DEFINED	244				
626	WLANR	REAL	REFS	107	DEFINED	245				
1004	WO	REAL	REFS	94	222	306				
3312	WP	REAL	REFS	57	222	307				

VARIABLES SN TYPE RELOCATION

3307	MPD	REAL	76	160	161	296
3316	MQ	REAL	68	306		
3313	WQ	REAL	77	282	283	284
3322	WR	REAL	69	222	307	
3317	WRD	REAL	78	296		
742	WRES	REAL	239	300	301	DEFINED 296
1114	WRQ1	REAL	38	3*223		
1116	WRQ2	REAL	40			
1122	WRQ3	REAL	42			
1122	WRQ4	REAL	44	3*225		
1115	WRR1	REAL	39			
1117	WRR2	REAL	41	3*224		
1121	WRR3	REAL	43			
1123	WRR4	REAL	45	3*226		
1074	WTQ1	REAL	22	214		
1076	WTQ2	REAL	24	212		
1075	WTR1	REAL	23	215		
1077	WTR2	REAL	25	213		
715	W1Q	REAL	223	DEFINED	222	
746	XL	REAL	53	196	197	

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EXTERNALS TYPE ARGS REFERENCES

ATAND	REAL	2	169	109
COSD	REAL	1	134	136
FINTP1	REAL	6	195	197
SIND	REAL	1	135	137

INLINE FUNCTIONS TYPE ARGS DEF LINE REFERENCES

ABS	REAL	1	INTRIN	2*198	205
AINT	REAL	1	INTRIN	265	256
SIGN	REAL	2	INTRIN	130	210
				217	266
				298	261
				299	282
					291

STATEMENT LABELS DEF LINE REFERENCES

10	1	131	128
0	2	178	174
0	3	INACTIVE	308
135	4	179	172
114	5	164	152
325	20	243	237
342	21	248	242
216	30	209	103
141	32	193	167
435	70	279	274
467	73	288	278
504	80	295	290
541	83	305	294
632	100	FMT	239
613	101	FMT	207

LOOPS LABEL INDEX FROM-TO LENGTH PROPERTIES INSTACK

132	2	L	174	178	38	
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COMMON BLOCKS / / LENGTH / / MEMBERS - BIAS NAME(LENGTH) / / 0 0 (3830)

EQUIV CLASSES	LENGTH	MEMBERS - BIAS NAME(LENGTH)
370 KXBA	(1)	370 KXBA
402 ML4Q	(1)	402 ML4Q
425 BT4G	(1)	425 BT4G
434 BEPS2	(1)	434 BEPS2
480 G21	(1)	480 G21
483 GQ3	(1)	483 GQ3
486 GR4	(1)	486 GR4
490 G26	(1)	490 G26
493 DTHGR	(1)	493 DTHGR
495 G2GCS	(1)	495 G2GCS
502 Q1	(1)	502 Q1
503 R1	(1)	503 R1
508 Q2	(1)	508 Q2
511 Q33	(1)	511 Q33
514 Q3	(1)	514 Q3
517 Q24	(1)	517 Q24
520 Q4	(1)	520 Q4
523 Q4	(1)	523 Q4
526 Q25	(1)	526 Q25
529 Q25	(1)	529 Q25
533 K5	(1)	533 K5
538 Q25	(1)	538 Q25
542 R6	(1)	542 R6
546 K22	(1)	546 K22
549 K23	(1)	549 K23
552 K25	(1)	552 K25
555 K27	(1)	555 K27
558 K210	(1)	558 K210
561 K211	(1)	561 K211
564 J1	(1)	564 J1
567 F20	(1)	567 F20
570 QERG	(1)	570 QERG
573 M21	(1)	573 M21
576 M21	(1)	576 M21
579 M22	(1)	579 M22
582 M24	(1)	582 M24
585 M25	(1)	585 M25
588 M21	(1)	588 M21
591 M22	(1)	591 M22
594 M24	(1)	594 M24
597 TOLQ	(1)	597 TOLQ
600 TARM	(1)	600 TARM
603 F20V	(1)	603 F20V
605 BRK2	(1)	605 BRK2
609 TATR	(1)	609 TATR
612 K20	(1)	612 K20
615 K21	(1)	615 K21
618 U22	(1)	618 U22
621 U22G	(1)	621 U22G
655 L22	(1)	655 L22
1676 ANGY	(1)	1676 ANGY
1738 WP	(1)	1738 WP
1743 M20	(1)	1743 M20
1750 U22	(1)	1750 U22
3511 13512	(1)	3511 13512
3633 ISNOX	(1)	3633 ISNOX
372 RTBA	(1)	372 RTBA
406 WLAH2	(1)	406 WLAH2
427 BPS10	(1)	427 BPS10
435 BEPSY	(1)	435 BEPSY
481 G22	(1)	481 G22
484 GR3	(1)	484 GR3
488 Q25	(1)	488 Q25
491 GR6	(1)	491 GR6
494 DTHRSQ	(1)	494 DTHRSQ
499 Q21	(1)	499 Q21
503 R1	(1)	503 R1
508 Q2	(1)	508 Q2
512 DR3	(1)	512 DR3
515 R3	(1)	515 R3
518 Q24	(1)	518 Q24
521 Q4	(1)	521 Q4
524 R4	(1)	524 R4
527 D2R5	(1)	527 D2R5
530 Q25	(1)	530 Q25
535 Q26	(1)	535 Q26
539 Q26	(1)	539 Q26
544 K21	(1)	544 K21
547 K22	(1)	547 K22
550 K25	(1)	550 K25
553 K26	(1)	553 K26
556 K28	(1)	556 K28
559 K210	(1)	559 K210
562 K212	(1)	562 K212
565 J0	(1)	565 J0
568 TUI	(1)	568 TUI
571 RERG	(1)	571 RERG
574 M22	(1)	574 M22
577 M21	(1)	577 M21
580 M23	(1)	580 M23
583 M24	(1)	583 M24
586 M26	(1)	586 M26
589 M21	(1)	589 M21
592 M23	(1)	592 M23
595 M24	(1)	595 M24
598 TCLR	(1)	598 TCLR
601 TARM	(1)	601 TARM
604 I2CS	(1)	604 I2CS
607 T2LAY	(1)	607 T2LAY
610 K20	(1)	610 K20
613 K21	(1)	613 K21
616 K20	(1)	616 K20
619 USC	(1)	619 USC
624 I2L	(1)	624 I2L
661 LOSY	(1)	661 LOSY
1677 ANGZ	(1)	1677 ANGZ
1739 M20	(1)	1739 M20
1746 WR	(1)	1746 WR
2019 LCONV	(1)	2019 LCONV

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STATISTICS

PROGRAM LENGTH	7503	400
CH BLANK COMMON LENGTH	73663	3830

60	EQUIVALENCE (C(1739), W3)	S3	59
	EQUIVALENCE (C(1743), W2)	S3	60
	EQUIVALENCE (C(1747), W2)	S3	61
	EQUIVALENCE (C(1751), GRA)	S3	62
	EQUIVALENCE (C(2000), TIME)	S3	63
	EQUIVALENCE (C(371), RANGE)	S3	64
	EQUIVALENCE (C(1676), ANG)	S3	65
	EQUIVALENCE (C(1677), ANG)	S3	66
	EQUIVALENCE (C(1678), ANG)	S3	67
	EQUIVALENCE (C(1736), W3)	S3	68
	EQUIVALENCE (C(1740), W3)	S3	69
	EQUIVALENCE (C(1744), W3)	S3	70
70	EQUIVALENCE (C(650), TIMESV)	S3	71
	EQUIVALENCE (C(651), LOSZ)	S3	72
	EQUIVALENCE (C(662), LOSY)	S3	73
	REAL LOSZ, LOSY	S3	74
75	DIMENSION TIMESV(6), LOSZ(6), LOSY(6), XL(2)	S3	75
	C**STATE VARIABLES	S3	76
	EQUIVALENCE (C(424), BTHTG3), (C(427), BTHT5)	S3	77
	EQUIVALENCE (C(428), BPSIG3), (C(431), BPSIG5)	S3	78
	EQUIVALENCE (C(500), DQ1), (C(503), DQ1)	S3	79
80	EQUIVALENCE (C(501), DQ1), (C(504), DQ1)	S3	80
	EQUIVALENCE (C(506), DQ2), (C(509), DQ2)	S3	81
	EQUIVALENCE (C(507), DQ2), (C(510), DQ2)	S3	82
	EQUIVALENCE (C(512), DQ3), (C(515), DQ3)	S3	83
	EQUIVALENCE (C(513), DQ3), (C(516), DQ3)	S3	84
85	EQUIVALENCE (C(514), DQ3), (C(517), DQ3)	S3	85
	EQUIVALENCE (C(520), DQ3), (C(523), DQ3)	S3	86
	C**OTHER OUTPUTS	S3	87
	EQUIVALENCE (C(435), BEPS2)	S3	88
90	EQUIVALENCE (C(436), BEPS2)	S3	89
	EQUIVALENCE (C(437), WLAH2)	S3	90
	EQUIVALENCE (C(438), WLAH2)	S3	91
	EQUIVALENCE (C(439), WLAH2)	S3	92
	EQUIVALENCE (C(440), BEPS2)	S3	93
	EQUIVALENCE (C(441), BEPS2)	S3	94
95	EQUIVALENCE (C(493), DTHC3), (C(494), DTHC5)	S3	95
	EQUIVALENCE (C(495), DTHC3), (C(496), DTHC5)	S3	96
	EQUIVALENCE (C(2020), LCON3), (C(625), IBL)	S3	97
	EQUIVALENCE (C(507), BRUKQ)	S3	98
100	C**MONTE CARLO PARAMETERS	S3	99
	EQUIVALENCE (C(553), ISND3), (C(552), IS512)	S3	100
	EQUIVALENCE (C(511), K3), (C(512), K3)	S3	101
	EQUIVALENCE (C(513), K3), (C(514), K3)	S3	102
105	EQUIVALENCE (C(515), K3), (C(516), K3)	S3	103
	EQUIVALENCE (C(517), K3), (C(518), K3)	S3	104
	EQUIVALENCE (C(519), K3), (C(520), K3)	S3	105
	EQUIVALENCE (C(521), K3), (C(522), K3)	S3	106
110	DATA FCV/4.7	S3	107
	C**INTEGRATION SWITCHING TEST	S3	108
	C**SYNCHRONIZE INTEGRATION WITH SAMPLE SIZE	S3	109
	IF(C(13).LE.0.163 TO 1	S3	110
	C(13)=1.	S3	111
		S3	112
		S3	113
		S3	114
		S3	115

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115 C(2664)=1/AINI(TAU/C(2764))
116 CONTINUE
117
118 C**DIRECTION COSINES FOR BODY TO PLATFORM TRANSFORMATION
119 UCI=COSD(HTIG)
120 UST=SIND(HTIG)
121 UCP=COSD(BPSIG)
122 USP=SIND(BPSIG)
123 UB11=UCI*UCP
124 UB12=USP
125 UB13=-UCP*UST
126 UB21=-UST*USP
127 UB22=UCP
128 UB31=UST
129 UB32=0.
130 UB33=UCI
131
132 C** TRANSFORM LOS FROM BODY TO GIMBAL AXES
133 RXG=UC11*RX3A+UB12*RYBA+UB13*RZBA
134 RYG=UB21*RX3A+UB22*RYBA+UB23*RZBA
135 RZG=UB31*RX3A+UB32*RYBA+UB33*RZBA
136 IF(13512.LE.0)GO TO 3
137 C**GYRO ERRORS
138
139 C**TRANSFORM NORMALIZED ACCELERATIONS FROM BODY TO GIMBAL AXES
140 ANGKG=UB11*ANGX+UB12*ANGY+UB13*ANGZ
141 ANGKG=UB21*ANGX+UB22*ANGY+UB23*ANGZ
142 ANGKG=UB31*ANGX+UB32*ANGY+UB33*ANGZ
143 ANG=ANGZ*JCCG-ANGY*USCG
144 QERG=KEG*KPJ*ANG*KQAJ*WPD
145 RERG=KEG*KPJ*ANG*KQAJ*WPD
146 TUG=KUG*(ANGX*UCT-ANGZ*UST)
147 TUI=KUI*(ANGY*UCC-ANGG*US)
148
149 C**LOS ERRORS IN PLATFORM COORDINATES
150 IF(1376).LE.0)GO TO 32
151 BEPSZ=ATAND(RZG/RXG)
152 BEPSY=ATAND(RYG/RXG)
153 DO 2 L=2,6
154 TIMESV(L-1)=TIMESV(L)
155 LOSZ(L-1)=LOSZ(L)
156 LOSY(L-1)=LOSY(L)
157 CONTINUE
158 TIMESV(6)=TIME
159 LOSZ(6)=BEPSZ
160 LOSY(6)=BEPSY
161 CONTINUE
162 TRACKER=LOOP
163
164 C**ZOM (TDELAY,TAU) AND TIME DELAY (TLAG)
165 IF(TIME.LT.(TDELAY+.0001))JR=C(1976).LE.0)GO TO 30
166 TDELAY=TIME+TAU
167
168
169
170
171
172

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175 THIQ=ATAND(THRY/2.,RANGE)
    THIR=ATAND(THRD/2.,RANGE)
    BRKQ=(BEPST-BEPSV)/(2.*T1TQ)
    BRKR=(BEPST-BEPSV)/(2.*T1TR)
    TLAG=TIME-TLAG B N=6 F-1.
    BEPSV=FINTP1 TLAG,THESV,LOSZ,N,F,XL)
    BEPSV=FINTP1 TLAG,THESV,LOSZ,N,F,XL)
    IF(ABS(BRLK11).LT..5 .AND. ABS(BRLKR).LT..5)GO TO 30
190 C**BREAKLOCK DETERMINATION
    IF(IGCS.NE.-10)GO TO 30
    IBL=IBL+1
    LCONV=2
    IGCS=-9
    WHICH = 104 IN WHICH
    IF(ABS(BRLK11).GE..5)WHICH = 10H IN YAM
    WRITE(6,101)TIME,RANGE,WHICH
101 FORMAT(1H0,100(11),/ BREAK LOCK CONDITION AT TIME = *F5.2,
    * RANGE = *F10.2,A10./100(1H*))
190 30 CONTINUE
    DELAYQ=Q1*3EPSZSV
    DELAYR=Q1*3EPSVSV
    Q1= DELAY3-WI2*31
    Q1= DELAY3-WI2*31
    DTHCQ=(Q1+T1*31)*5Q2
    DTHCR=(Q1+T1*31)*5R2
    C RATE COMMAND LIMIT
    IF(ABS(DTHCQ).GT.RCL)DTHCQ=SIGN(RCL,DTHCQ)
    IF(ABS(DTHCR).GT.RCL)DTHCR=SIGN(RCL,DTHCR)
200 C C RATE GYRO LOOP
    C
    C
    X1Q=NC*JCP-(WP*UJ1-WR*UST)*JSP
    RGQ=GS*(W1+REX1)
    RGR=GRS*(W1+REX1)
    DTHRGQ=Q12*RGQ
    DTHRGR=K12*RGR
    C
    C**BLIND RANGE DETERMINATION
210 THIOAQ=THIQ+ABS(3EPSZ)
    THIOAR=THIR+ABS(3EPSV)
    BLNOQ=THIOAQ*2./FOV
    BLNOR=THIOAR*2./FOV
    TESTFCV=FFOV*FOV/2.
    IF(THIOAQ.LT.TESTFOV.AND. THIOAR.LT.TESTFOV) GO TO 20
    IF(IGCS.LE.0)WRITE(6,100)TIME,RANGE
100 FORMAT(1H0,100(11),/ OCS BLIND RANGE SIGNAL HOLD AT TIME = *F5.2,
    * RANGE = *F10.2/100(1H*))
    IGCS=10
220 GO TO 21
    20 CONTINUE
    C
    C**OUTPUT TO AUTOPILOT
    WLAHQ=GEQCS*RG2
    WLAHR=GEQCS*RGR
225 IF(ABS(C(63011).LT.ABS(BRLKQ))C(630)=BRLKQ
    IF(ABS(C(63111).LT.ABS(BRLKR))C(631)=BRLKR
    21 CONTINUE

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.01669

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3	CONTINUE	S3	287
	RETURN	S3	288
	END	S3	289

SYMBOLIC REFERENCE MAP (R=3)

ENTRY POINTS DEF LINE REFERENCES
1-S3 1 207

VARIABLES	SM	TYPE	RELOCATION	REFS	145	146	DEFINED	144	143	167
637 ANG	REAL			REFS	54	141	142	143		
3213 ANG	REAL	/ /		REFS	148	141	142	143		
634 ANG	REAL			REFS	65	141	142	143		
3214 ANG	REAL	/ /		REFS	144	148	142	143		
635 ANG	REAL			REFS	56	141	142	143		
3215 ANG	REAL	/ /		REFS	144	141	142	143		
636 ANG	REAL	/ /		REFS	93	141	142	143		
663 BEPSV	REAL	/ /		REFS	93	141	142	143		
1015 BEPSV	REAL	/ /		REFS	93	141	142	143		
662 BEPSZ	REAL	/ /		REFS	94	141	142	143		
1020 BEPSZ	REAL	/ /		REFS	94	141	142	143		
655 BNDQ	REAL	/ /		REFS	212	141	142	143		
656 BNDQ	REAL	/ /		REFS	213	141	142	143		
655 BPSIG	REAL	/ /		REFS	78	141	142	143		
653 BPSIG	REAL	/ /		REFS	78	141	142	143		
1136 BRLKQ	REAL	/ /		REFS	38	141	142	143		
641 BRLKQ	REAL	/ /		REFS	179	141	142	143		
652 BTHG	REAL	/ /		REFS	77	141	142	143		
647 BTHG	REAL	/ /		REFS	77	141	142	143		
0 C	REAL	/ /	ARRAY	REFS	7	141	142	143		
2*19				REFS	2*20	141	142	143		
2*27				REFS	2*28	141	142	143		
2*35				REFS	2*36	141	142	143		
2*43				REFS	2*44	141	142	143		
51				REFS	52	141	142	143		
61				REFS	62	141	142	143		
69				REFS	70	141	142	143		
2*81				REFS	2*82	141	142	143		
91				REFS	92	141	142	143		
2*182				REFS	2*183	141	142	143		
115				REFS	116	141	142	143		
226				REFS	227	141	142	143		
3326 GRAD	REAL	/ /		REFS	51	141	142	143		
646 DELAYQ	REAL	/ /		REFS	133	141	142	143		
647 DELAYR	REAL	/ /		REFS	134	141	142	143		
763 QQ1	REAL	/ /		REFS	79	141	142	143		
771 QQ2	REAL	/ /		REFS	91	141	142	143		
777 QQ3	REAL	/ /		REFS	93	141	142	143		
764 DR1	REAL	/ /		REFS	90	141	142	143		
772 DR2	REAL	/ /		REFS	92	141	142	143		
1000 DR3	REAL	/ /		REFS	94	141	142	143		
754 DTHCQ	REAL	/ /		REFS	95	141	142	143		
755 DTHCR	REAL	/ /		REFS	95	141	142	143		
756 DTHCRQ	REAL	/ /		REFS	96	141	142	143		
757 DTHCRQ	REAL	/ /		REFS	96	141	142	143		
660 DTHCQ	REAL	/ /		REFS	234	141	142	143		
661 DTHCQ	REAL	/ /		REFS	235	141	142	143		
673 DHAQ	REAL	/ /		REFS	265	141	142	143		
702 DHAQ	REAL	/ /		REFS	282	141	142	143		
672 DHAQ	REAL	/ /		REFS	265	141	142	143		

VARIABLES	SM	TYPE	RELOCATION	REFS	292	DEFINED	270	179
701 OMBAR	REAL			REFS	292	DEFINED	270	179
1007 OM1	REAL			REFS	36	DEFINED	271	262
1001 OM0	REAL			REFS	95	DEFINED	255	265
644 F	REAL			REFS	177	DEFINED	176	
1333 FFOV	REAL			REFS	49			
540 FOV	REAL			REFS	212	DEFINED	189	
1066 FRI	REAL			REFS	35		2276	277
1067 PRO	REAL			REFS	36		2259	260
760 GEOS	REAL			REFS	51		225	
737 GQ1	REAL			REFS	41			
741 GQ2	REAL			REFS	41			
743 GQ3	REAL			REFS	43			
745 GQ4	REAL			REFS	43			
750 GQ5	REAL			REFS	45			
752 GQ6	REAL			REFS	45			
740 GR1	REAL			REFS	42			
742 GR2	REAL			REFS	42			
744 GR3	REAL			REFS	44			
746 GR4	REAL			REFS	44			
751 GR5	REAL			REFS	46			
753 GR6	REAL			REFS	46			
1160 ICL	INTEGER			REFS	97	DEFINED	182	
1134 IOCS	INTEGER			REFS	30	DEFINED	184	219
7061 ISNOX	INTEGER			REFS	102			
6667 I3512	INTEGER			REFS	102			
1664 JI	REAL			REFS	11		271	277
1665 JO	REAL			REFS	11		255	260
1145 KBI	REAL			REFS	10		146	
1144 KBO	REAL			REFS	10		145	
1151 KOAI	REAL			REFS	10		166	
1150 KOAO	REAL			REFS	10		145	
1147 KPI	REAL			REFS	10		145	
1146 KPO	REAL			REFS	10		145	
1040 KQ1	REAL			REFS	8			
1056 KQ10	REAL			REFS	8			
1060 KQ11	REAL			REFS	8			
1062 KQ12	REAL			REFS	8		206	
1042 KQ2	REAL			REFS	8			
1044 KQ3	REAL			REFS	8			
610 KQ4	REAL		*UNDEF	REFS	8			
1046 KQ5	REAL			REFS	8			
1050 KQ6	REAL			REFS	8			
1052 KQ7	REAL			REFS	8			
1054 KQ8	REAL			REFS	8		251	
611 KQ9	REAL		*UNDEF	REFS	8			
1041 KR1	REAL			REFS	9			
1057 KR10	REAL			REFS	9			
1061 KR11	REAL			REFS	9			
1063 KR12	REAL			REFS	9		207	
1043 KR2	REAL			REFS	9			
1045 KR3	REAL			REFS	9			
612 KR4	REAL		*UNDEF	REFS	9			
1047 KR5	REAL			REFS	9			
1051 KR6	REAL			REFS	9			
1053 KR7	REAL			REFS	9			
1055 KR8	REAL			REFS	9		267	
613 KR9	REAL		*UNDEF	REFS	9			

VARIABLES	SM	TYPE	RELOCATION	REFS	256	258	263	DEFINED	167
1071 TUC	REAL	/ /	REFS	38	141	DEFINED	123	DEFINED	167
620 UB11	REAL	/ /	REFS	134	141	DEFINED	124		
621 UB12	REAL	/ /	REFS	134	141	DEFINED	125		
622 UB13	REAL	/ /	REFS	134	141	DEFINED	126		
623 UB21	REAL	/ /	REFS	135	142	DEFINED	127		
624 UB22	REAL	/ /	REFS	135	142	DEFINED	128		
625 UB23	REAL	/ /	REFS	135	142	DEFINED	129		
626 UB31	REAL	/ /	REFS	136	143	DEFINED	130		
627 UB32	REAL	/ /	REFS	136	143	DEFINED	131		
630 UB33	REAL	/ /	REFS	136	143	DEFINED			
1152 UCC	REAL	/ /	REFS	107	148				
1154 UCCG	REAL	/ /	REFS	138	144				
616 UCP	REAL	/ /	REFS	123	125	127	203	DEFINED	121
614 UCT	REAL	/ /	REFS	123	126	131	147	283	274
1153 USC	REAL	/ /	REFS	119	148				285
1155 USCG	REAL	/ /	REFS	107	144				
617 USP	REAL	/ /	REFS	138	144	129	203	DEFINED	122
615 UST	REAL	/ /	REFS	125	128	129	147	203	274
671 MCOQ	REAL	/ /	DEFINED	120		260			285
700 MCOQ	REAL	/ /	REFS	2+262	DEFINED	277			
1100 MGQ1	REAL	/ /	REFS	2+279	DEFINED				
1102 MGQ2	REAL	/ /	REFS	17	236				
1104 MGQ3	REAL	/ /	REFS	19					
1106 MGQ4	REAL	/ /	REFS	21	241				
1110 MGQ5	REAL	/ /	REFS	23	236				
1112 MGQ6	REAL	/ /	REFS	25					
1101 MGR1	REAL	/ /	REFS	27					
1103 MGR2	REAL	/ /	REFS	18	237				
1105 MGR3	REAL	/ /	REFS	20					
1107 MGR4	REAL	/ /	REFS	22	242				
1111 MGR5	REAL	/ /	REFS	24	237				
1113 MGR6	REAL	/ /	REFS	26					
645 WHICH	REAL	/ /	REFS	28					
1012 MI	REAL	/ /	REFS	197	DEFINED	185	186		
622 WLAHQ	REAL	/ /	REFS	96	205	205			
626 WLAHR	REAL	/ /	REFS	91	DEFINED	224			
1004 WO	REAL	/ /	REFS	92	DEFINED	225			
3312 W	REAL	/ /	REFS	85	203	203			
3307 WPD	REAL	/ /	REFS	58	202	205			
3316 WD	REAL	/ /	REFS	67	145	146	274		
3313 WDJ	REAL	/ /	REFS	59	284				
3322 WR	REAL	/ /	REFS	58	260	251	262		
3317 WRD	REAL	/ /	REFS	50	203	205			
677 WRES	REAL	/ /	REFS	59	274				
1114 WRQ1	REAL	/ /	REFS	277	279	279	DEFINED	274	
1116 WRQ2	REAL	/ /	REFS	29					
1120 WRQ3	REAL	/ /	REFS	31					
1122 WRQ4	REAL	/ /	REFS	33					
1115 WRR1	REAL	/ /	REFS	35					
1117 WRR2	REAL	/ /	REFS	30					
1121 WRR3	REAL	/ /	REFS	32					
1123 WRR4	REAL	/ /	REFS	34					
1074 WTQ1	REAL	/ /	REFS	26					
1076 WTQ2	REAL	/ /	REFS	13	195				
1175 WTR1	REAL	/ /	REFS	15	193				
	REAL	/ /	REFS	14	196				

VARIABLES SN TYPE RELOCATION

1077 WTR2 REAL /

650 W1Q REAL /

703 XL REAL ARRAY

FILE NAMES MODE

TAPE6 FMT WRITES 107 216

EXTERNALS TYPE ARGS REFERENCES

ATAND REAL 2 153 172 173

COSD REAL 1 113 121

FINIP1 REAL 6 177 178

SIND REAL 1 121 122

INLINE FUNCTIONS TYPE ARGS DEF LINE REFERENCES

ABS REAL 1 INTRIN 2*179 186 198 199 210 211 2*226 2*227

AINT REAL 1 INTRIN 242 244 252 259 2*262 250 276 2*279

SIGN REAL 2 INTRIN 115 139 243 253 259 269 276 277

STATEMENT LABELS DEF LINE REFERENCES

10 1 116 113

0 2 160 155

0 3 INACTIVE 285 137

114 5 149 137

301 20 221 215

314 21 228 220

214 30 190 171 179 181

136 32 164 152

371 70 257 252

423 73 266 255

440 80 273 263

475 83 283 272

566 100 FMT 217 215

547 101 FMT 188 187

LOOPS LABEL INDEX FROM-TO LENGTH PROPERTIES

127 2 L 156 160 38 INSTACK

COMMON BLOCKS LENGTH MEMBERS -BIAS NAME(LENGTH)

3330 0 C (3030)

EQUIV CLASSES LENGTH MEMBERS -BIAS NAME(LENGTH)

370 370 373 373 423 430 479 482 485 489 492 495 500 503 509 513 513

370 373 423 430 479 482 485 489 492 495 500 503 509 513 513

370 373 423 430 479 482 485 489 492 495 500 503 509 513 513

370 373 423 430 479 482 485 489 492 495 500 503 509 513 513

370 373 423 430 479 482 485 489 492 495 500 503 509 513 513

370 373 423 430 479 482 485 489 492 495 500 503 509 513 513

370 373 423 430 479 482 485 489 492 495 500 503 509 513 513

370 373 423 430 479 482 485 489 492 495 500 503 509 513 513

370 373 423 430 479 482 485 489 492 495 500 503 509 513 513

370 373 423 430 479 482 485 489 492 495 500 503 509 513 513

370 373 423 430 479 482 485 489 492 495 500 503 509 513 513

370 373 423 430 479 482 485 489 492 495 500 503 509 513 513

370 373 423 430 479 482 485 489 492 495 500 503 509 513 513

370 373 423 430 479 482 485 489 492 495 500 503 509 513 513

370 373 423 430 479 482 485 489 492 495 500 503 509 513 513

370 373 423 430 479 482 485 489 492 495 500 503 509 513 513

370 373 423 430 479 482 485 489 492 495 500 503 509 513 513

370 373 423 430 479 482 485 489 492 495 500 503 509 513 513

370 373 423 430 479 482 485 489 492 495 500 503 509 513 513

370 373 423 430 479 482 485 489 492 495 500 503 509 513 513

EQUIV CLASSES LENGTH MEMBERS --BIAS NAME(LENGTH)

515 W0	(1)	519 DM1	(1)	522 W1	(1)
525 BEPSYSV	(1)	526 BEPSZSV	(1)	544 KQ1	(1)
545 K21	(1)	546 KQ2	(1)	547 KR2	(1)
548 K23	(1)	549 KR3	(1)	550 KQ5	(1)
551 KR5	(1)	552 KQ5	(1)	553 KR6	(1)
554 KQ7	(1)	555 KR7	(1)	556 K28	(1)
557 K28	(1)	558 KQ10	(1)	559 KR10	(1)
560 K211	(1)	561 KR11	(1)	562 K212	(1)
563 KR12	(1)	564 J1	(1)	565 J0	(1)
566 K21	(1)	567 FR0	(1)	568 TUI	(1)
569 I03	(1)	570 Q23	(1)	571 RER	(1)
572 W101	(1)	573 W121	(1)	574 W1Q2	(1)
575 W122	(1)	576 W211	(1)	577 WGR1	(1)
578 W222	(1)	579 W222	(1)	580 WQ3	(1)
581 W233	(1)	582 W234	(1)	583 WGR4	(1)
584 W225	(1)	585 W235	(1)	586 WQ6	(1)
587 W2R6	(1)	588 W221	(1)	589 WRR1	(1)
590 W222	(1)	591 W232	(1)	592 WQ3	(1)
593 WRR3	(1)	594 W204	(1)	595 WRR4	(1)
596 W21	(1)	597 TOLQ	(1)	598 TOLR	(1)
599 TAU	(1)	600 TASHT	(1)	601 TARM0	(1)
602 WBL0CK	(1)	603 FFOV	(1)	604 JCCS	(1)
605 FL4G	(1)	606 BRUCL	(1)	607 TOLAY	(1)
608 HTQ	(1)	609 T4TR	(1)	610 KU0	(1)
611 KJ1	(1)	612 K2J	(1)	613 K81	(1)
614 KPO	(1)	615 KPI	(1)	616 KQAO	(1)
617 KQAI	(1)	618 UCC	(1)	619 USC	(1)
620 U23G	(1)	621 US2G	(1)	624 IBL	(1)
649 JINESV	(6)	655 LOSZ	(6)	661 LOSY	(6)
1675 ANGK	(1)	1675 ANGY	(1)	1677 ANGZ	(1)
1735 WPO	(1)	1738 W2	(1)	1739 WQ0	(1)
1742 WQ	(1)	1743 W20	(1)	1746 W	(1)
1750 C2AD	(1)	1999 TIME	(1)	2019 LCCNV	(1)
3511 L3512	(1)	3633 ISNDX	(1)		

STATISTICS

PROGRAM LENGTH 7053 453
CH.BLANK COMMON LENGTH 73668 3830